Rural Watershed Initiative Workshop nee Master Watershed Steward

12/6/2006 & 7/13/2007

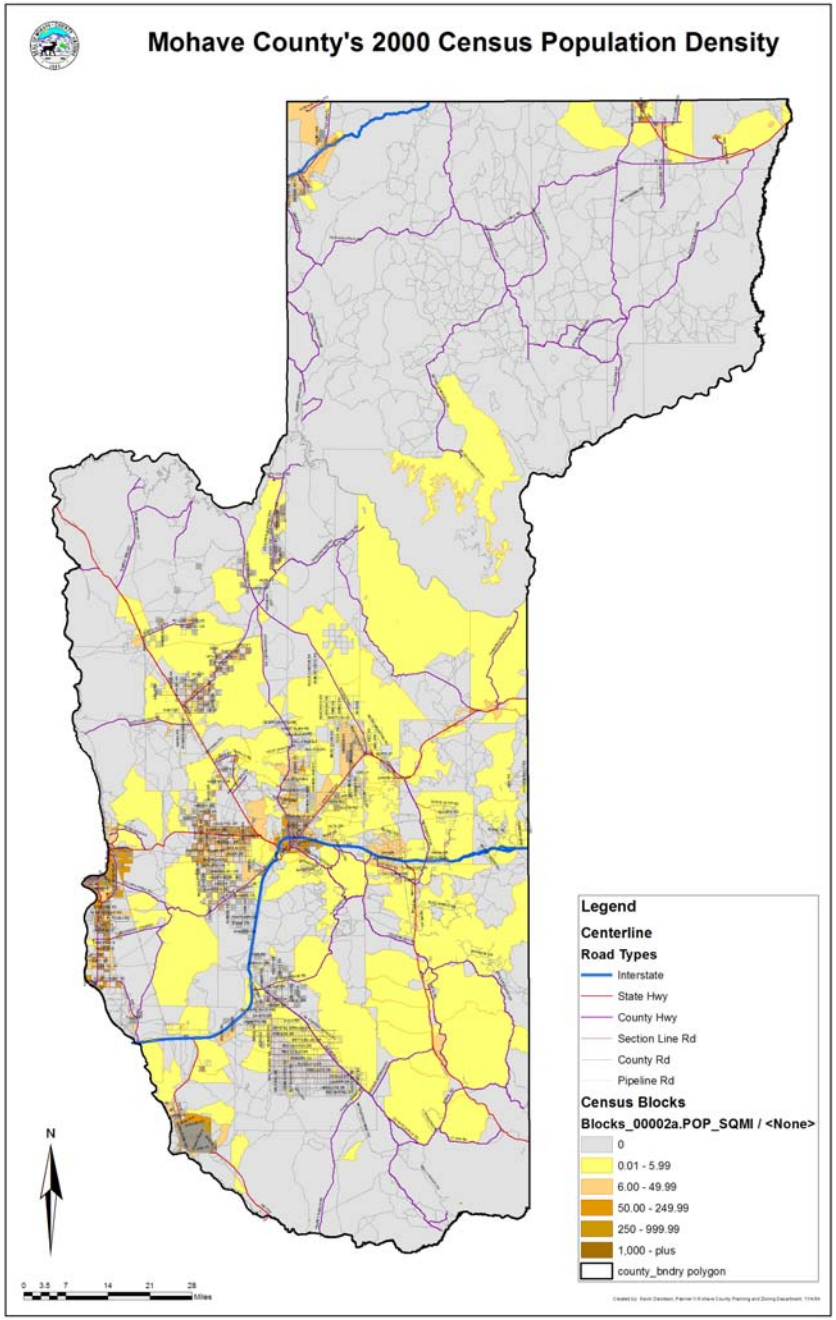
Overview of Mohave County
Review of "New City" Proposals
Arizona Revised Statutes
The General Plan
Other County Regulations
Water Wisdom

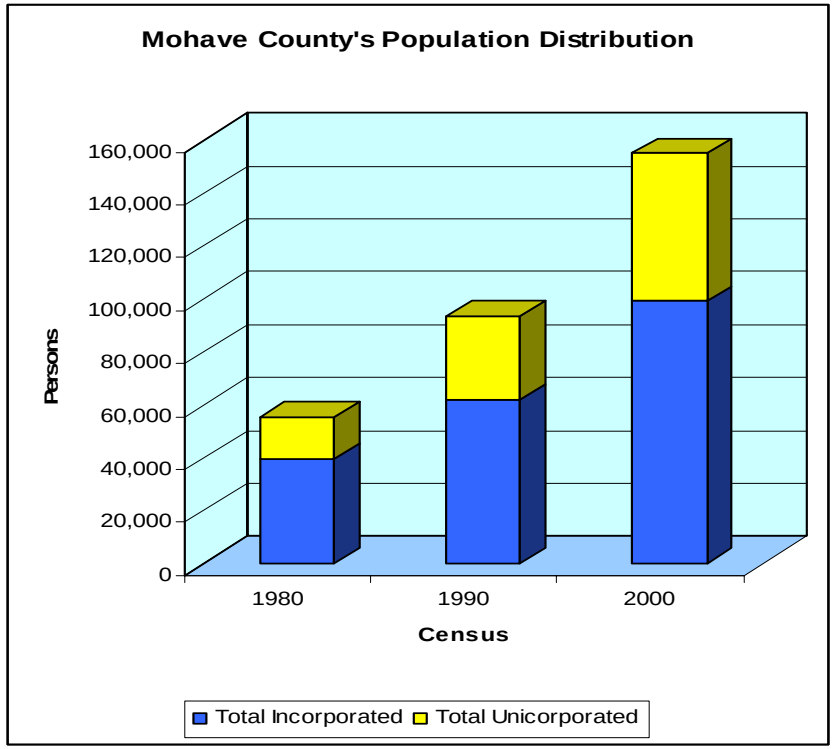
Kevin A. Davidson, Planner II

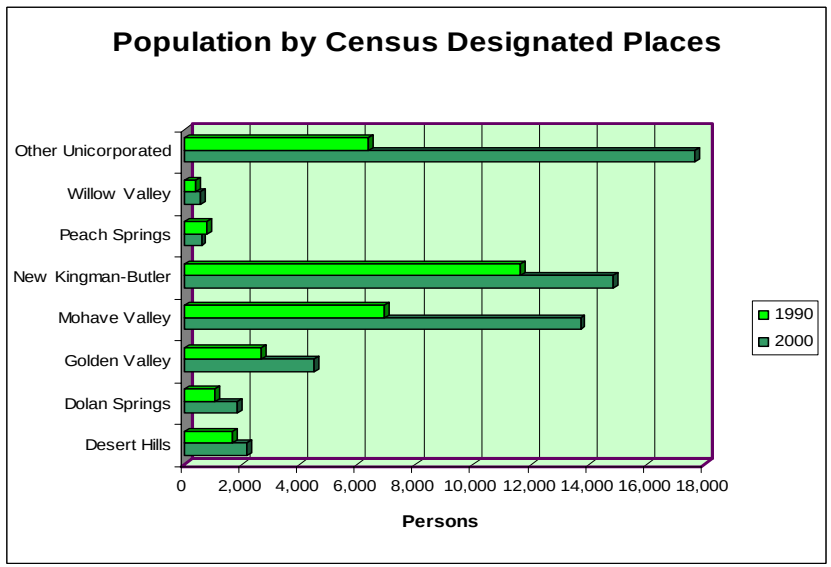
Mohave County Planning & Zoning Dept

(928) 757-0903

E-Mail: kevin.davidson@co.mohave.az.us

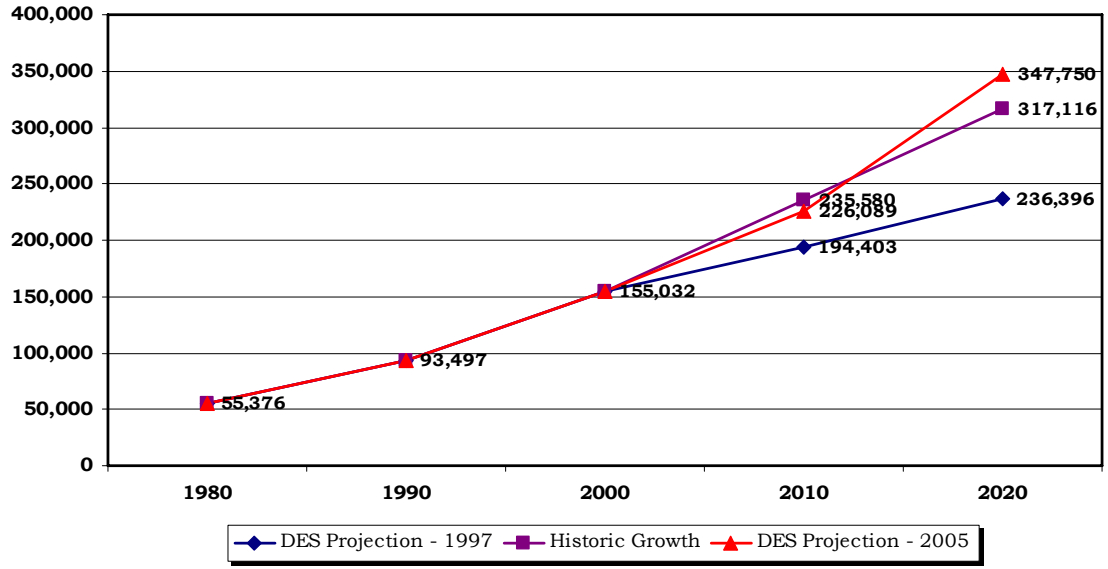

Mohave County's 2000 Census Population Density
Legend
Centerline
Road Types
Interstate
State Hwy
County Hwy
Section Line Rd
County Rd
Pipeline Rd
Census Blocks
Blocks_00002a.POP_SQMI / <None>
0
0.01 - 5.99
6.00 - 49.99
50.00 - 249.99
250 - 999.99
1,000 - plus
county_bndry polygon
N


Mohave County's Population Distribution
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Persons
1980
1990
2000
Census
Total Incorporated
Total Unicorporated


Population by Census Designated Places
Other Unicorporated
Willow Valley
Peach Springs
New Kingman-Butler
Mohave Valley
Golden Valley
Dolan Springs
Desert Hills
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
Persons
1990
2000

Growth Indicators

Exhibit III.10 High/Low Population Growth Curves



Single-Family Building Permits
1990 - 2004

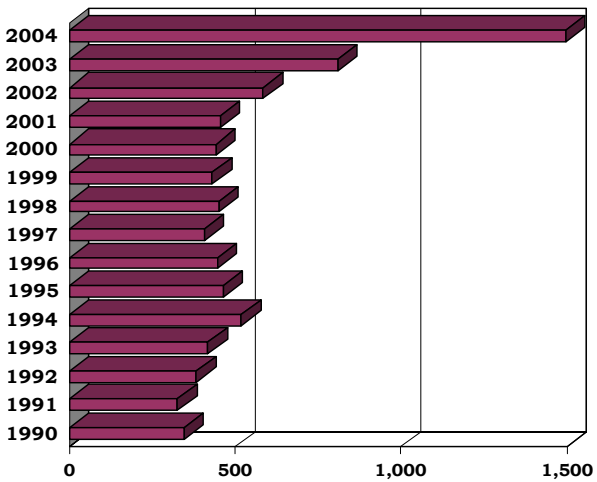
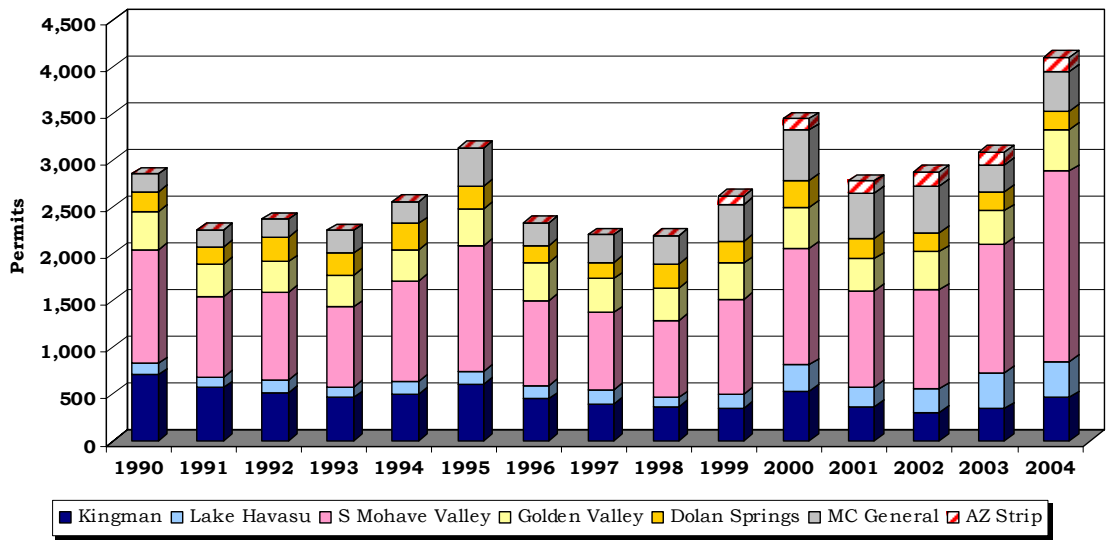
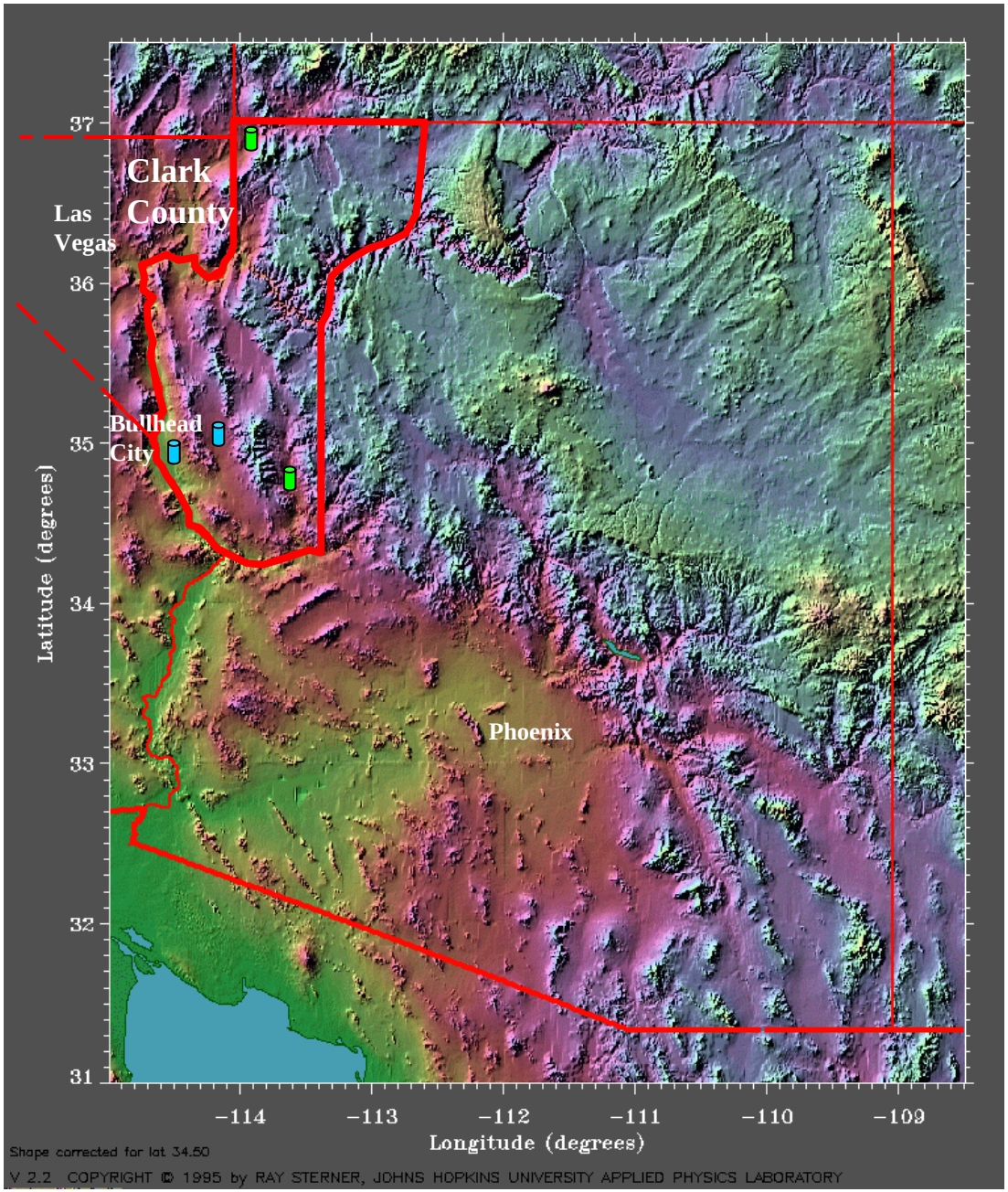


Exhibit III.6: Permits for New Construction by Area



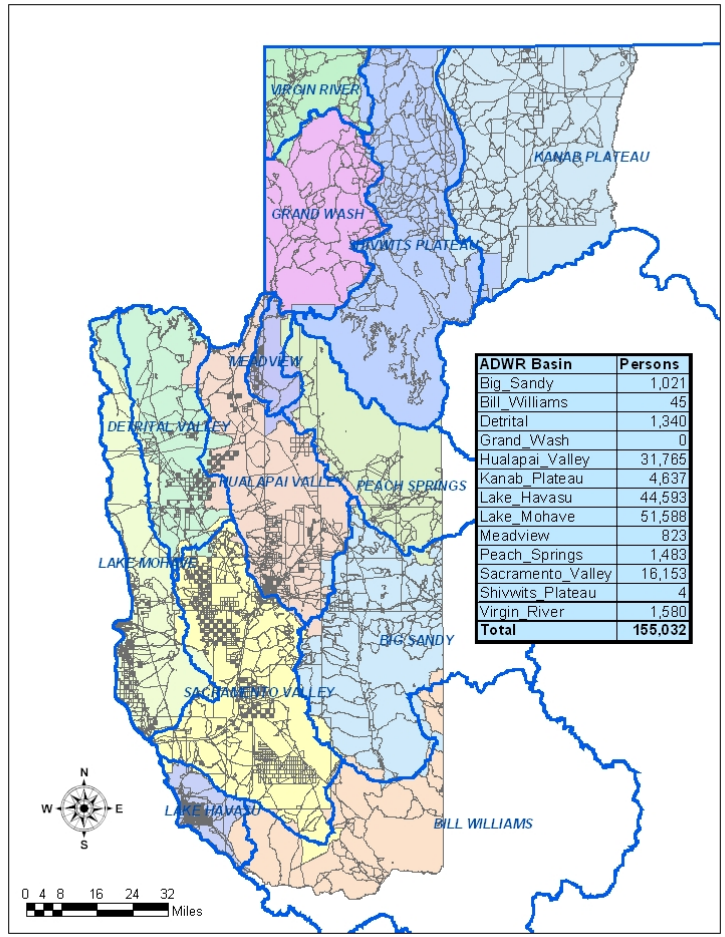


Topographic Map of Arizona showing Basin and Range Province

- Existing combined cycle wet-cooled power plants
- Proposed combined cycle wet-cooled power plants

Well Count (Source: ADWR Wells 55 Database, 11/2000) and Groundwater Inventory				
Watershed/Basin/Sub-basin	**# Wells (exempt)**	**Drainage BasinArea (Sq. miles)**	**Avg Well Depth**	**Est Ac-Ft in Storage**
Bill Williams Watershed				
Big Sandy/Fort Rock	172 (154)	See Wikieup	332	250,000
Big Sandy/Wikieup[3]	1,079 (830)	1,900	246	2,750,000
Bill Williams/Alamo	96 (64)	3,200	235	?
Bill Williams/Burro Creek	80 (64)	See Alamo	382	?
Bill Williams/Clara Peak	56 (12)	See Alamo	152	?
Bill Williams/Santa Maria	1 (1)	See Alamo	No Data	?
Colorado River Watershed				
Detrital Valley	249 (143)	875	437	1,000,000
Grand Wash	48 (12)	960	726	?
Hualapai Valley	880 (668)	1,820	432	5,000,000
Lake Havasu	380 (89)	275	175	71,204*
Lake Mohave	2,670 (1,907)	1,050	139	170,563*
Meadview	39 (10)	190	601	62,440
Peach Springs	33 (25)	1,400	307	1,000,000
Sacramento Valley[4]	1,207 (858)	1,400	368	7,000,000
Virgin River Watershed				
Kanab Plateau[5]	723 (192)	4,470	487	?
Shivwits Plateau[5]	133 (18)	1,820	614	?
Virgin River	443 (246)	433	254	1,700,000
Total	**8,289 (5,293)**		**273**	

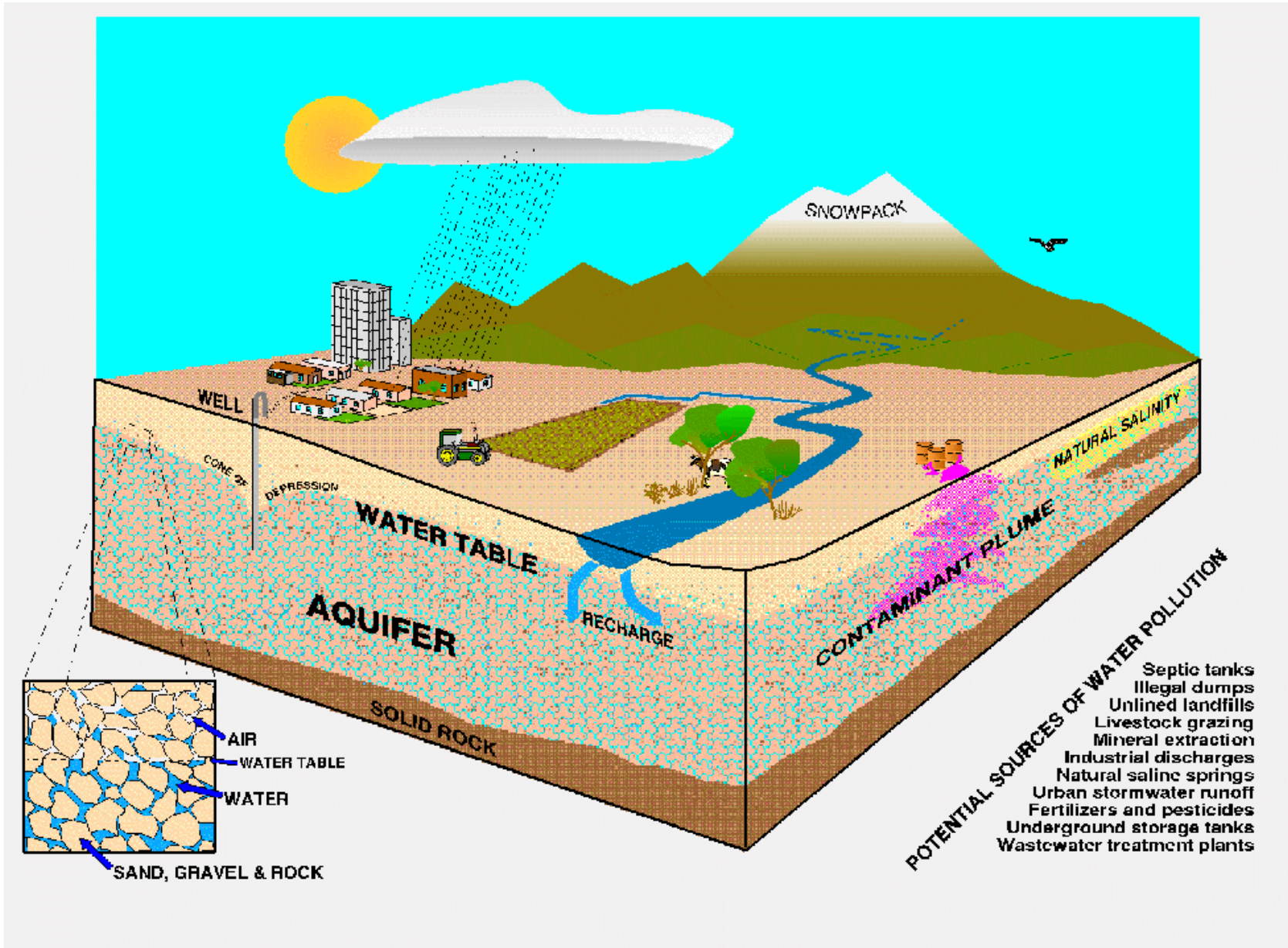
ADWR Drainage Basins and 2000 Census Block Overlay



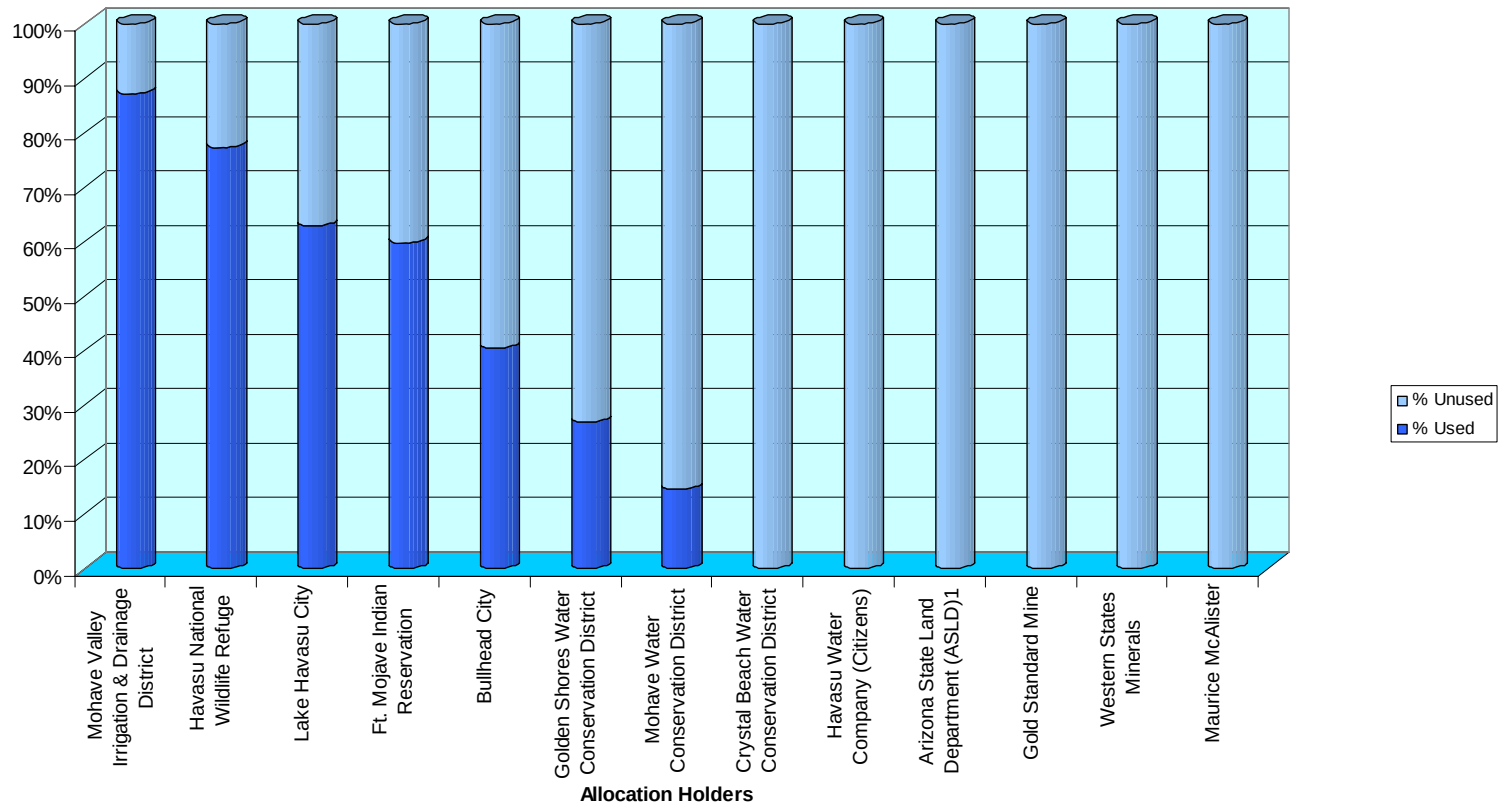
ADWR Basin	Persons
Big_Sandy	1,021
Bill_Williams	45
Detrital	1,340
Grand_Wash	0
Hualapai_Valley	31,765
Kanab_Plateau	4,637
Lake_Havasu	44,593
Lake_Mohave	51,588
Meadview	823
Peach_Springs	1,483
Sacramento_Valley	16,153
Shivwits_Plateau	4
Virgin_River	1,580
Total	**155,032**

Water Resources in Mohave County

Groundwater in Basin & Range Province



2002 Bureau of Reclamation Allocation Usages



Entitlement Holders in Mohave County	2002 Usage	% Used	% Unused	Unused Balance	Acre-Feet Allocation
Mohave Valley Irrigation & Drainage District	35,770	87.24%	12.76%	5,230	41,000
Havasu National Wildlife Refuge	32,326	77.26%	22.74%	9,513	41,839
Lake Havasu City	15,821	62.83%	37.17%	9,359	25,180
Ft. Mojave Indian Reservation	61,982	59.87%	40.13%	41,553	103,535
Bullhead City	8,575	40.43%	59.57%	12,635	21,210
Golden Shores Water Conservation District	538	26.90%	73.10%	1,462	2,000
Mohave Water Conservation District	701	14.60%	85.40%	4,099	4,800
Crystal Beach Water Conservation District	0	0.00%	100.00%	132	132
Havasu Water Company (Ariz American)	0	0.00%	100.00%	1,420	1,420
Arizona State Land Department (ASLD)1	0	0.00%	100.00%	466	466
Gold Standard Mine	0	0.00%	100.00%	75	75
Western States Minerals	0	0.00%	100.00%	70	70
Maurice McAlister	0	0.00%	100.00%	40	40
Total	**155,713**	**64.41%**	**35.59%**	**86,054**	**241,767**

Exhibit VI.4
Countywide Land Use Diagram

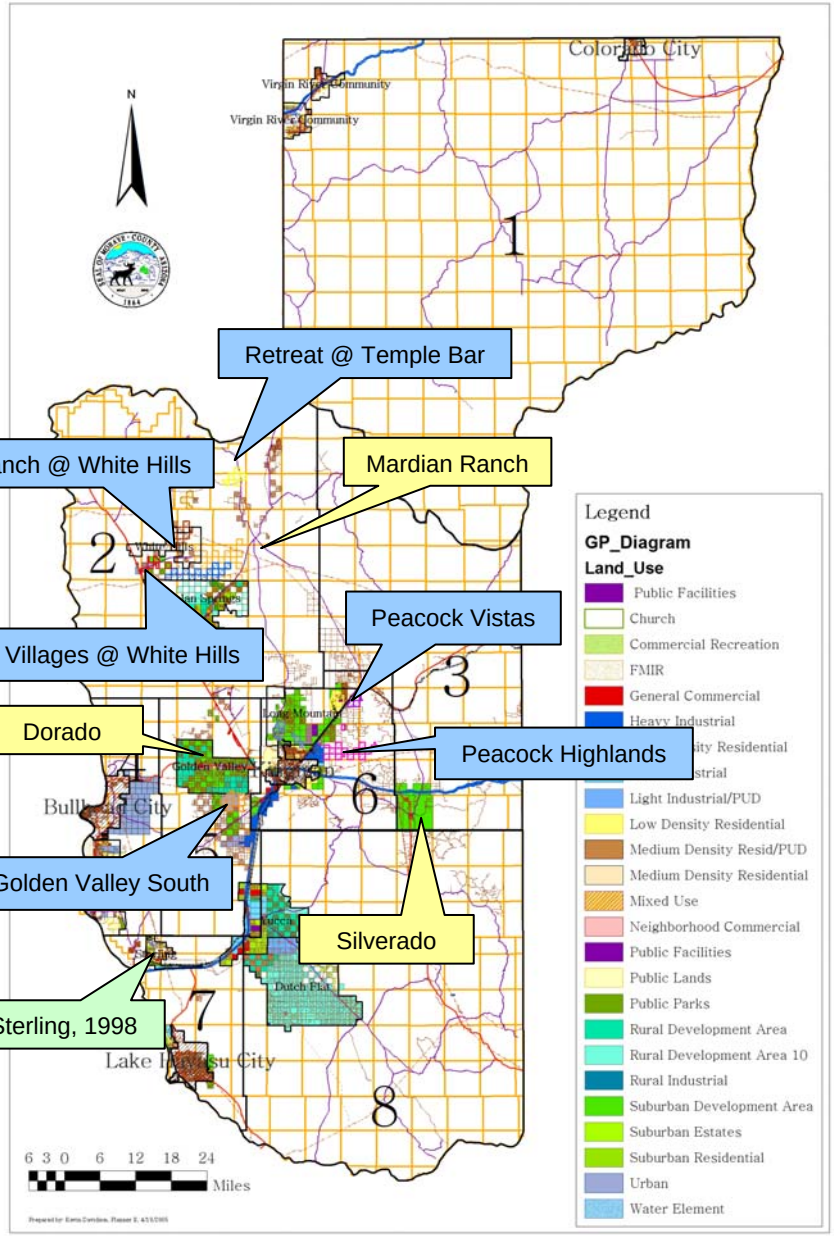


Exhibit VI.6
Countywide Land Use Diagram – Sub Area 2

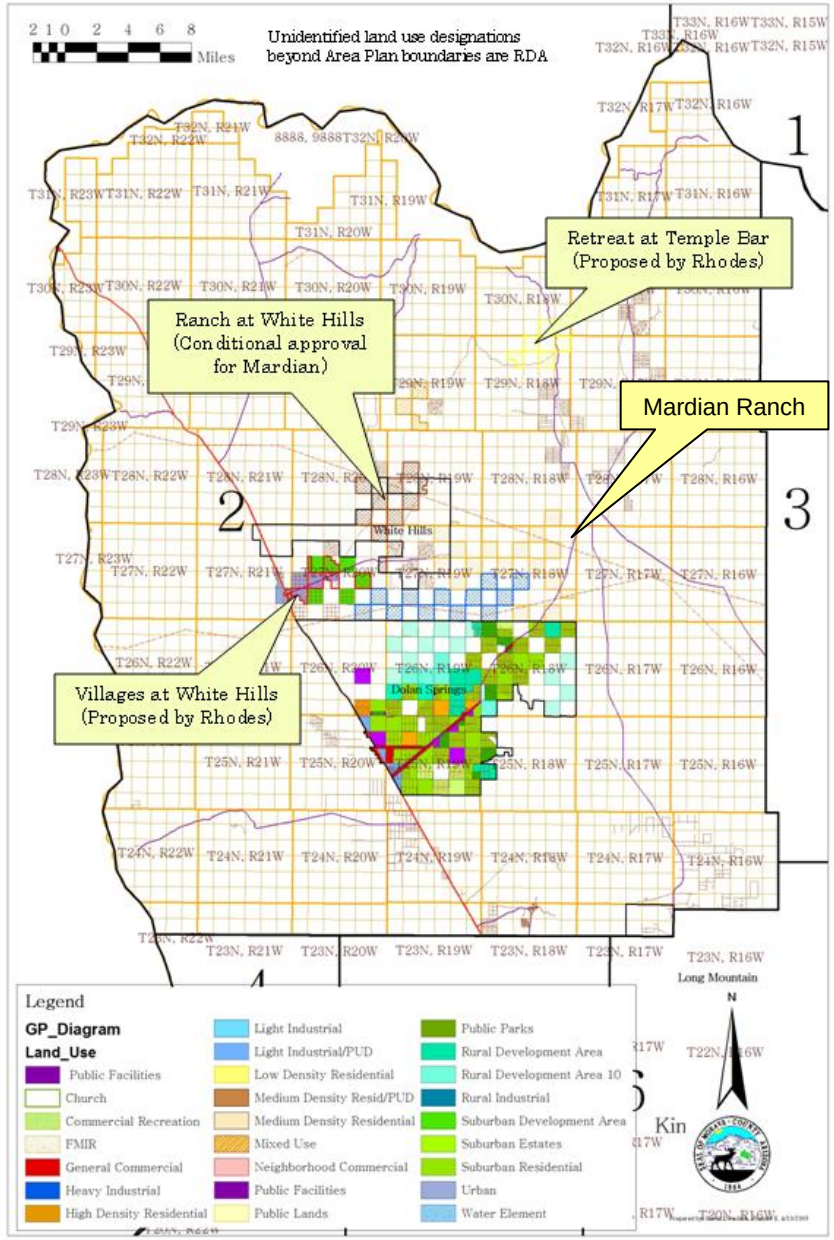


Exhibit VI.16
Kingman Area Detailed Land Use Diagram

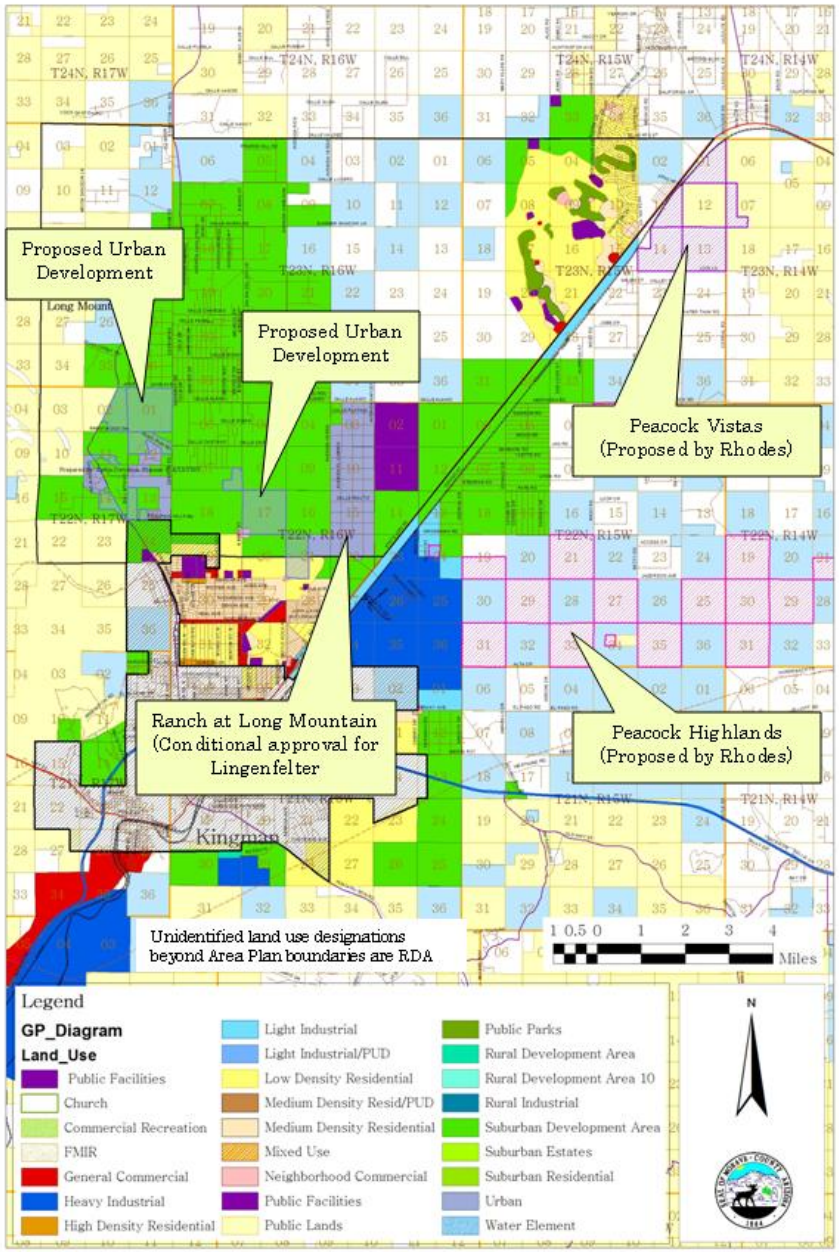
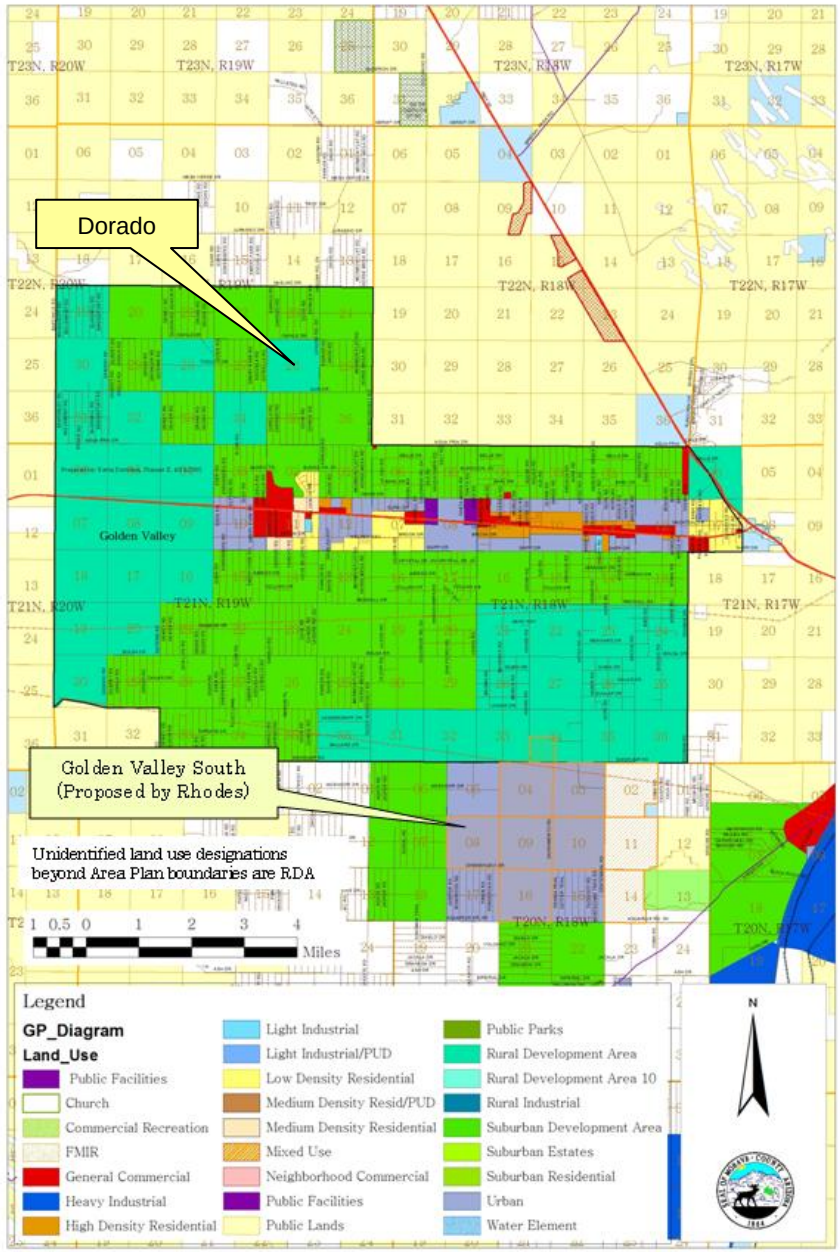
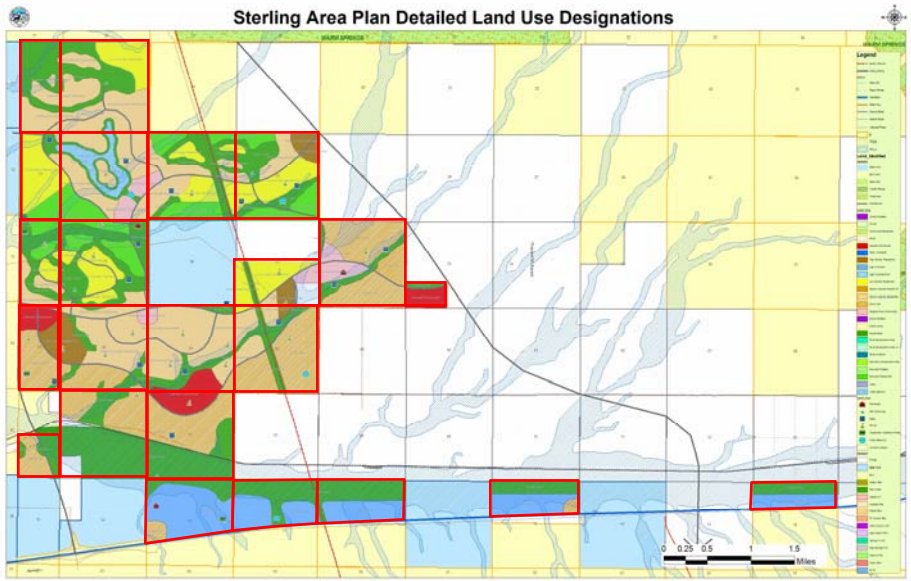


Exhibit VI.17
Golden Valley Detailed Land Use Diagram





New City of Sterling

Status:

Conditionally approved by P&ZC and BOS in 1999. Waiting for ADOT to build Hwy 95 Bypass. Latest inquiry was to purchase site for an organic farm.

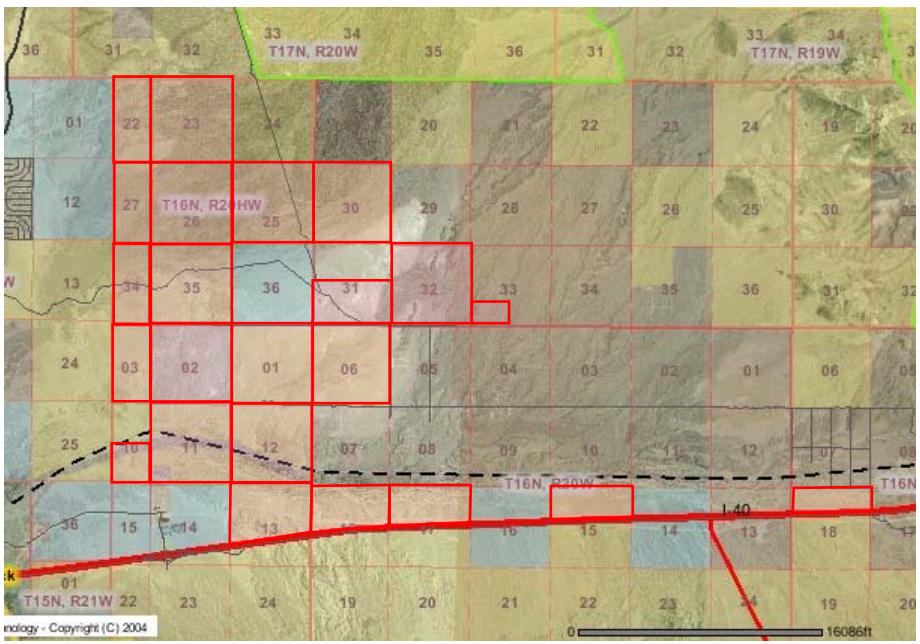
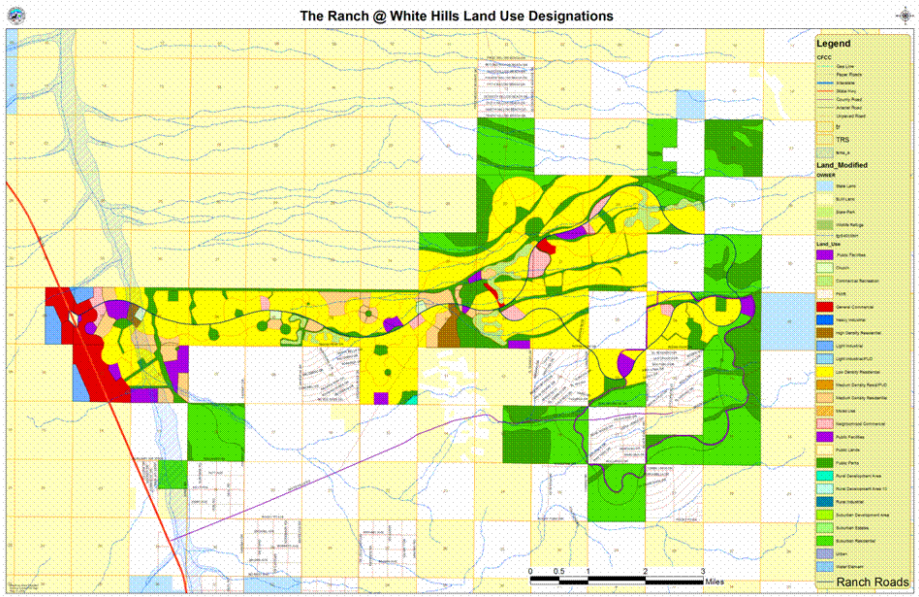


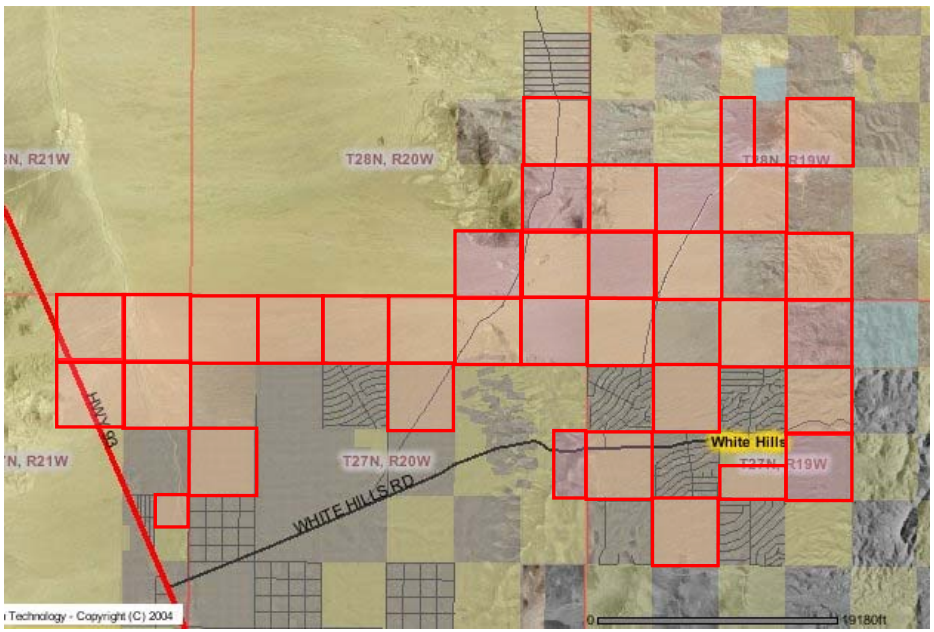
TABLE 2 : Sterling Area Plan Land Use Statistical Summary

Land Use	Gross Acres	Density Range	Unit Range	Target Density	Target Units	Units Yield	Pop Yield
Residential							
SR--Suburban	480	1 to 1	480 to 480	1	480	360	900
LR--Low Density	815	2 to 5	1,630 to 4,075	3	2,445	1,834	4,584
MR--Medium Density	2,145	6 to 12	12,870 to 25,740	9	19,305	14,479	36,197
HR--High Density	270	13 to 25	3,510 to 6,750	18	4,860	3,645	9,113
Subtotal	**3,710**		**18,490 to 37,045**	**7.3**	**27,090**	**20,318**	**50,794**
Non-Residential							
Commercial Subtotal	400						
NC-Neighborhood Commercial 205							
GC-General Commercial 195							
LI-Light Industrial	810						
Mixed Use	1,665						
Golf/Clubhouse/Lake	960						
Open Space/Parks	2,210						
Public Uses & Community Facilities	245						
Fire/Police Stations 10	-						
Schools 190	-						
Community Center/Medical 10	-						
Water Storage 20	-						
Wastewater Treatment 15	-						
Subtotal	**6,290**						
Area Plan Total	**10,000**		**18,490 to 37,045**	**7.3**	**27,090**	**20,318**	**50,794**

Notes:

1) Target range generally represents the mid-point of the land use density for each residential category.
2) Units yield are derived by deducting 25% land area coverage for roads, slopes and drainage.
3) Population yield is calculated by using an overall average of 2.5 persons per dwelling unit.
4) Acreage's do not include "Not-A-Part's" denoting State of Arizona Lands and private property.





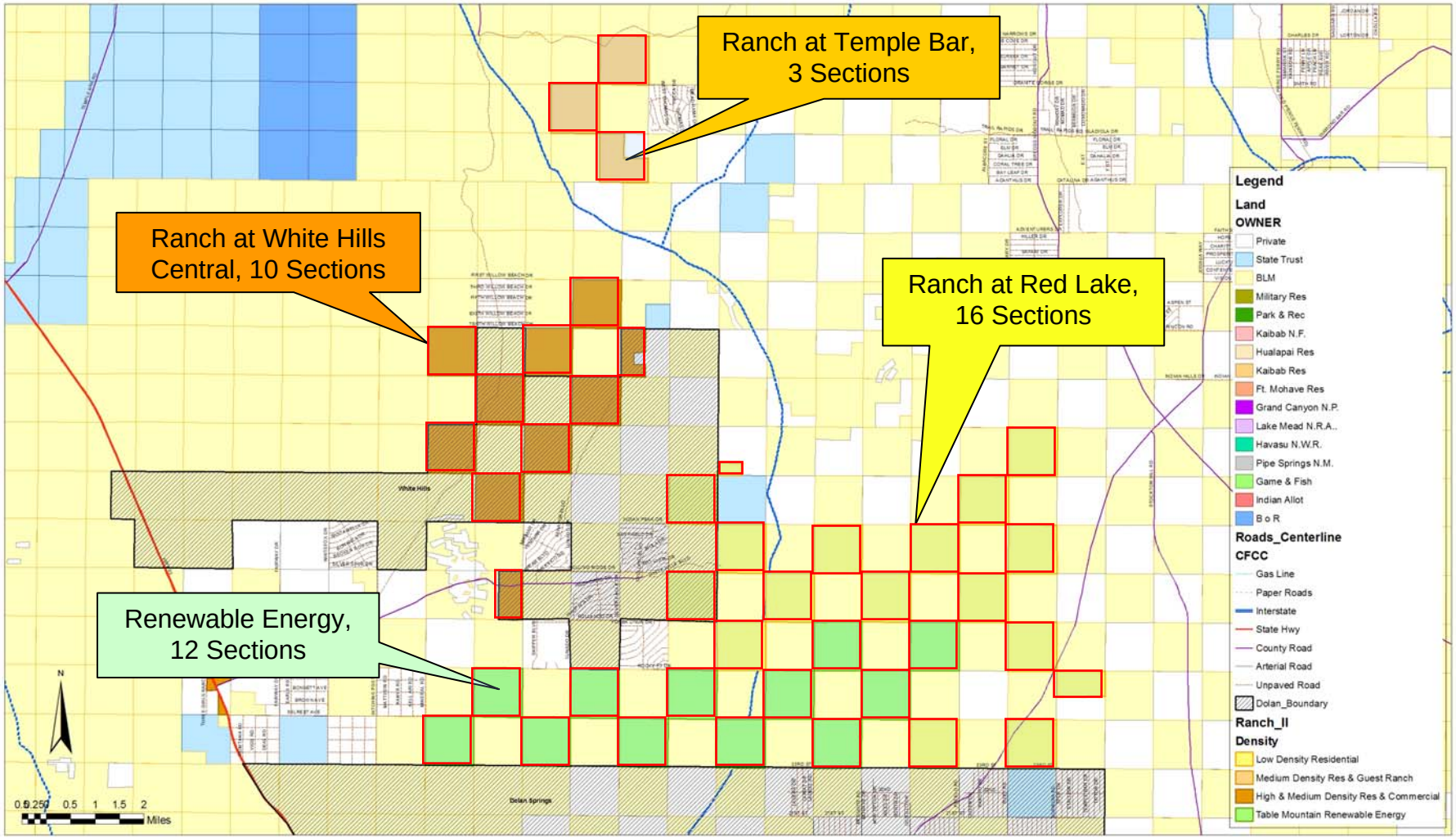
The Ranch at White Hills, Mark I

Status:

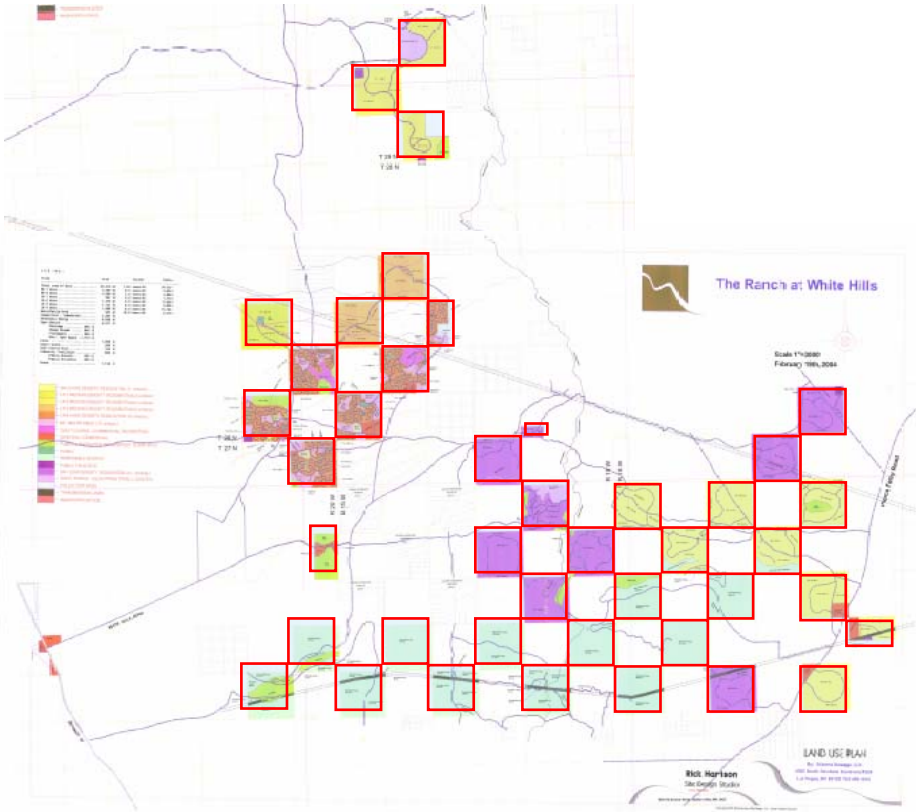
Conditionally approved by P&ZC and BOS in 2003 contingent upon completion of land exchange with BLM. Land exchange placed on hold by State Office of BLM.

Land Use Designation	Description	Area (acres)	% of Site	# of Homes	Density Range
Open Space	Natural areas and preserves	3192.15	15%		
Parks	Neighborhood and community parks and trails	828.01	4%		
Commercial Recreation	Equestrian area and golf courses	661.07	3%		
Public Facilities	Schools, colleges, police, fire stations, utility facilities, civic and medical buildings and churches	570.54	2.7%		
Suburban Residential	Suburban style lots of 1 acre	5381.03	25%	3,300	
Low Density Residential	Single family homes	7,796.16	37%	23,338	1-5 units per acre
Medium Density Residential	Single family, Patio homes, manor homes and town homes.	786.12	4%	6,288	5 – 11 units per acre
High Density Residential	Condominiums and apartments.	152.79	0.7%	1,990	12 – 25 units per acre
Neighborhood Commercial	Retail, services and offices oriented to meeting the local neighborhood needs.	214.76	1%		
General Commercial	Retail, office and services designed to meet community and sub-regional needs.	644.75	3%		
Office	Offices, services,	154.19	0.7%		
Industrial	Light industrial uses benefiting by proximity to an airport, manufacturing, distribution and wholesale businesses	245.89	1%		
Roads	Rights-of-way	613	2.9%		
TOTALS		21,240	100%	34,916	Average 1.64 units/acre

The Ranch at White Hills and Existing Land Tenure Pattern



The Ranch at White Hills, Mark II: Non-Exchange proposal presented in 2004



The Ranch at White Hills, Mark II: Non-Exchange proposal presented in 2004

Status:

Conditionally approved by P&ZC and BOS in 2004. Waiting for first preliminary plat submittal.

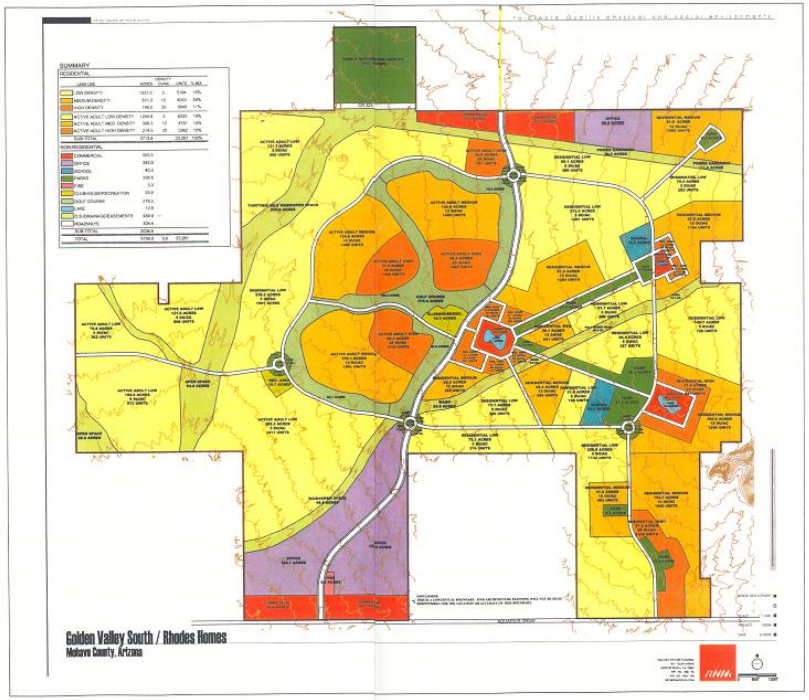
Land Use Designation	Description	Area (acres)	% of Site	# of Homes	Density Range
Open Space	Natural areas and preserves	2,511	10%		
Parks	Neighborhood and community parks and trails	1,008	4.0%		
Commercial Recreation	Guest ranches and golf courses	552	2.2%		
Public Facilities	Schools, police, fire stations, utility facilities, civic buildings and churches	680	2.7%		
Suburban Residential	Suburban style lots of 1 acre	4,060	16.1%	4,060	
Suburban Residential	Suburban style lot of 2 acres	4,090	16.3%	2,045	
Low Density Residential	Single family homes	2,290	9%	7,353	1-5 units per acre
Medium Density Residential	Single family, Patio homes, manor homes and town homes.	2,496	10%	15,799	5 -10 units per acre
High Density Residential	Condominiums and apartments.	547	2.2%	5,470	10+units per acre
Neighborhood / General Commercial / Industrial	Retail, services and offices oriented to meeting the local / sub-regional neighborhood needs.	1,201	4.7%		
Renewable energy	Wind, solar, water recharge	4,584	18.2%		
Roads	Rights-of-way	1,148	4.6%		
TOTALS		25,167	100%		Average units/acre

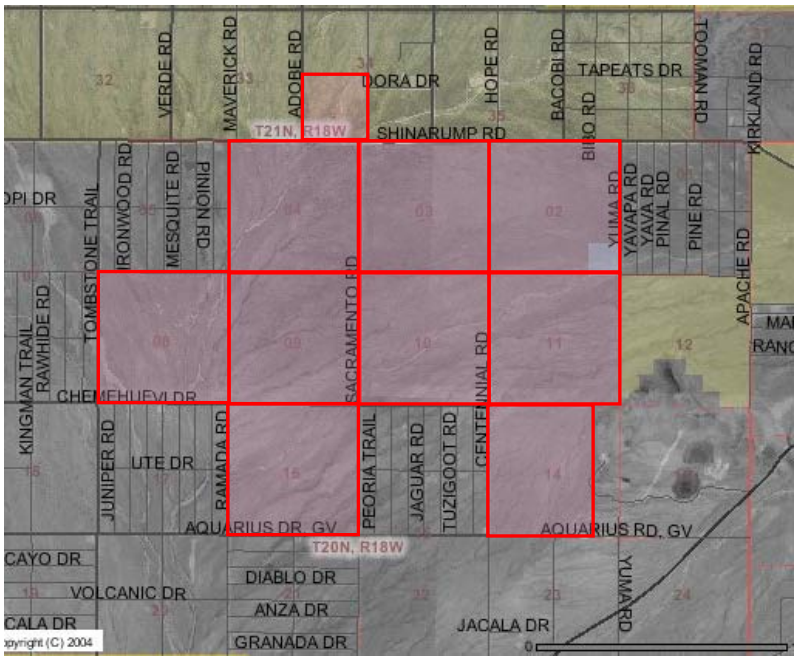
Five New Urban Center Proposals by

Rhodes Homes

Submitted to P&Z: March 3, 2005

Proposal	*Acres*	*Dwellings*	*Non-Resid Ac*	*Golf Course*
Golden Valley South	5,750	32,756	2,139	One
Peacock Highlands	7,176	46,026	2,727	Three
Peacock Vistas	2,088	13,000	189	No
The Village at White Hills	2,727	20,049	565	No
The Retreat at Temple Bar	3,040	19,078	610	One
Total	**20,781**	**130,909**	**6,230**	**Five**





Status:

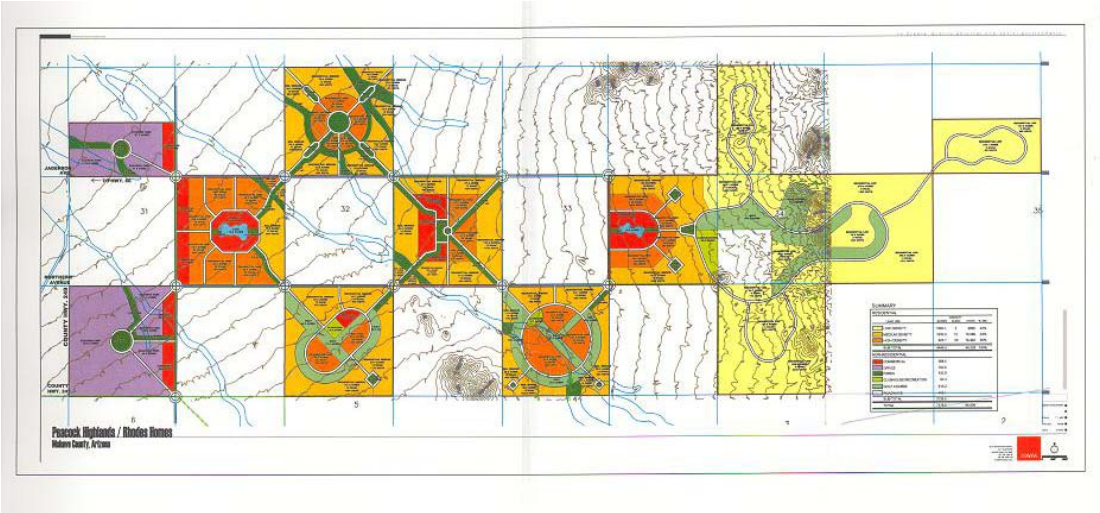
Planning & Zoning Commission recommended conditional approval on 9/21/2005 with Board of Supervisors approval on 12/5/2005

GOLDEN VALLEY SOUTH
LAND USE SUMMARY
FEB. 17, 2005

RESIDENTIAL				
LAND USE	**ACRES**	**DENSITY**	**DU**	**% MIX**
LOW DENSITY	1043	5	5215	16%
MEDIUM DENSITY	681	12	8172	25%
HIGH DENSITY	145	25	3625	11%
ACTIVE ADULT LOW DENSITY	1129	5	5645	17%
ACTIVE ADULT MEDIUM DENSITY	402	12	4824	15%
ACTIVE ADULT HIGH DENSITY	211	25	5275	16%
SUB TOTAL	3611		32,756	100%

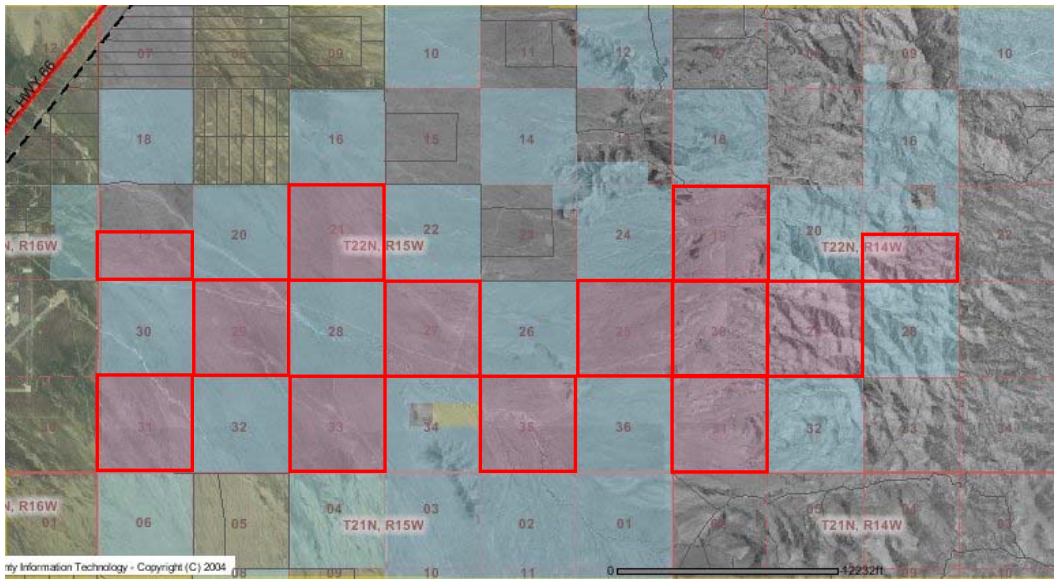
NON-RESIDENTIAL	
COMMERCIAL	201
OFFICE	404
SCHOOL	36
PARKS*	288
FIRE	5
CLUBHOUSE/RECREATION	28
GOLF COURSE	247
LAKE*	21
O.S./DRAINAGE/EASEMENTS*	663
ROADWAYS*	246
SUB TOTAL	2139

TOTAL	5750	5.7	32,756



Status:

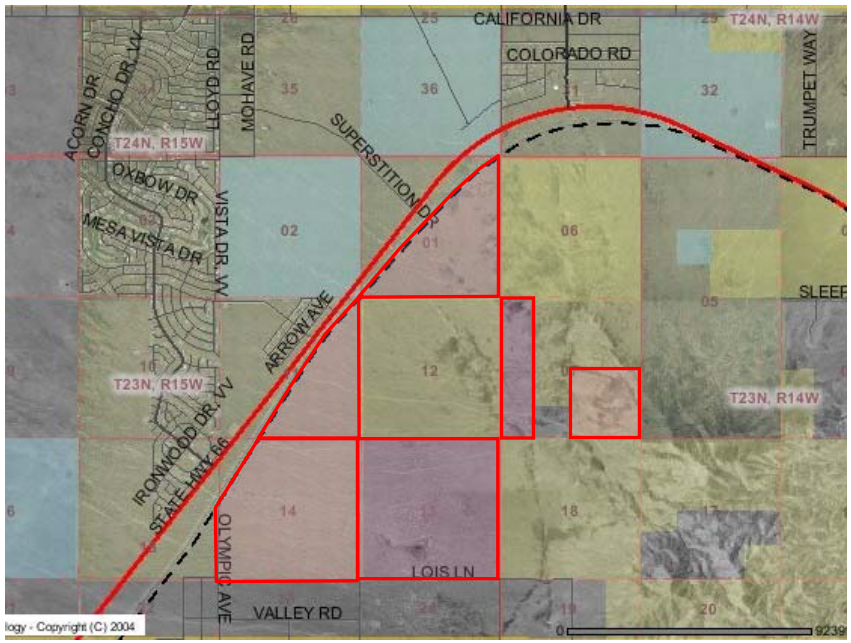
Planning & Zoning Commission recommended conditional approval on 9/21/2005 with Board of Supervisors approval on 12/5/2005.



PEACOCK HIGHLANDS LAND USE SUMMARY
FEB. 24, 2005

RESIDENTIAL				
LAND USE	**ACRES**	**DENSITY**	**DU**	**% MIX**
LOW DENSITY	1993.1	5	9,965	22%
MEDIUM DENSITY	1633.0	12	19,599	43%
HIGH DENSITY	823.1	20	16,462	35%
SUB TOTAL	4449.5		46,026	100%

NON-RESIDENTIAL		
COMMERCIAL	388.4	
OFFICE	762.6	
PARKS*	432.9	
CLUBHOUSE/RECREATION	62.3	
GOLF COURSE	615.2	
ROADWAYS*	465.1	
SUB TOTAL	2726.5	
TOTAL	7176.0	46,026



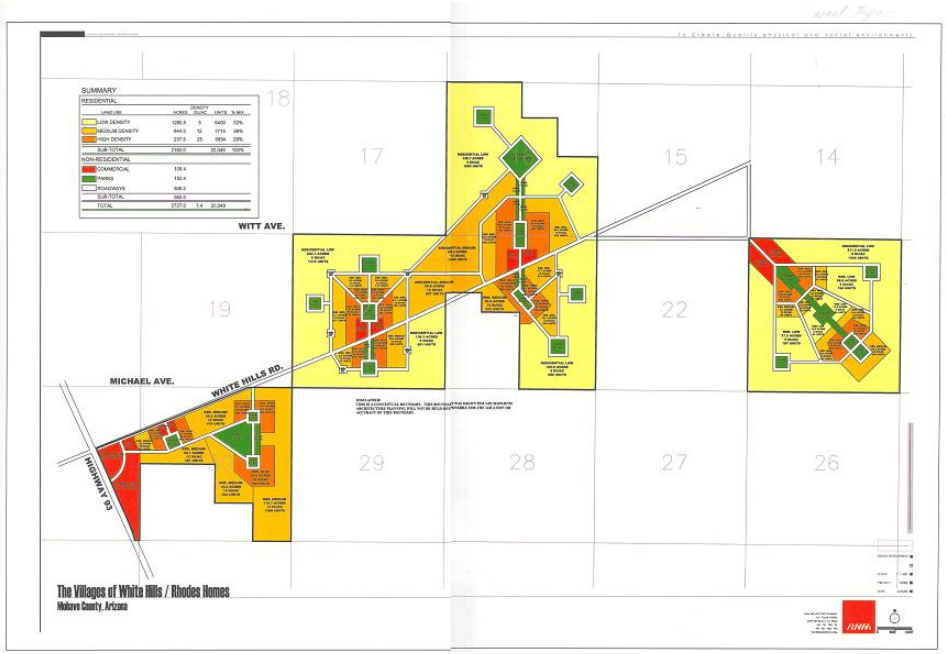
Status:

Planning & Zoning Commission recommended conditional approval on 9/21/2005 with Board of Supervisors approval on 12/5/2005.

PEACOCK VISTAS LAND USE SUMMARY

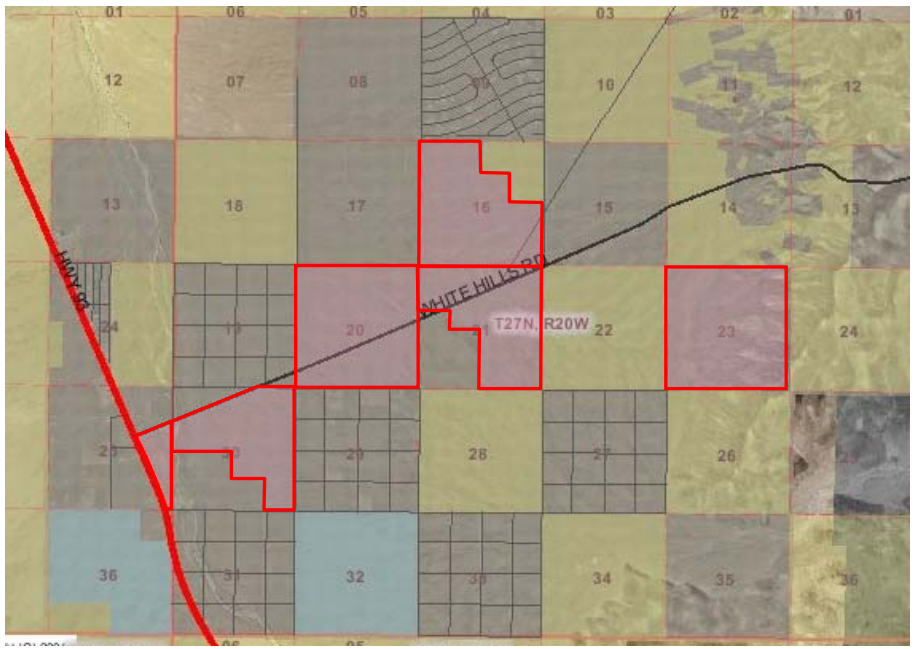
FEB. 24, 2005

RESIDENTIAL				
LAND USE	**ACRES**	**DENSITY**	**DU**	**%MIX**
LOW DENSITY	957.3	4	3,826	30%
MEDIUM DENSITY	352.6	6	2,115	16%
HIGH DENSITY	588.5	12	7,059	54%
SUB TOTAL	1,898.4		13,000	100%
NON-RESIDENTIAL				
COMMERCIAL	139.0*			
ROADWAYS	50.1*			
SUB TOTAL	189.1			
TOTAL	2,087.5	6.2	13,000	



Status:

Planning & Zoning Commission recommended conditional approval on 9/21/2005 with Board of Supervisors approval on 12/5/2005.

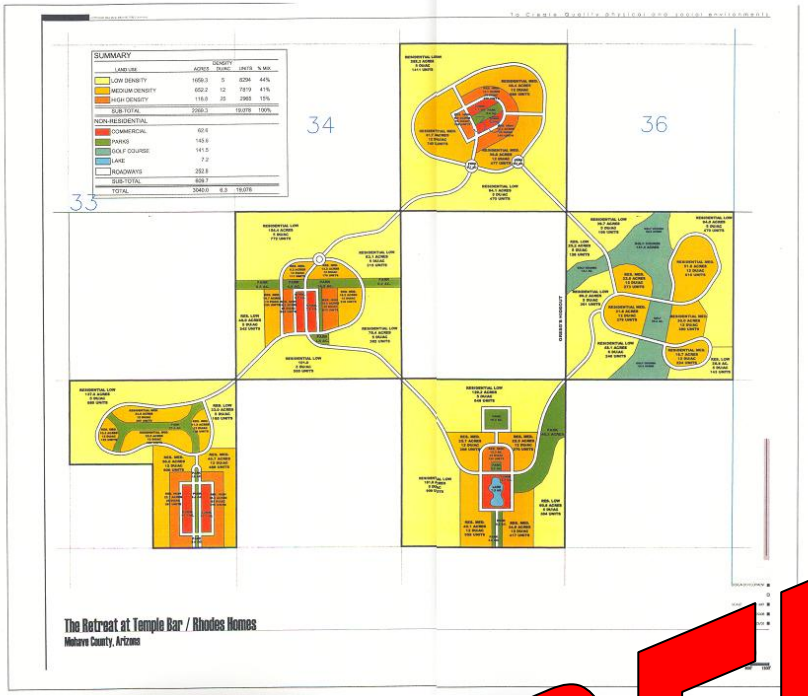


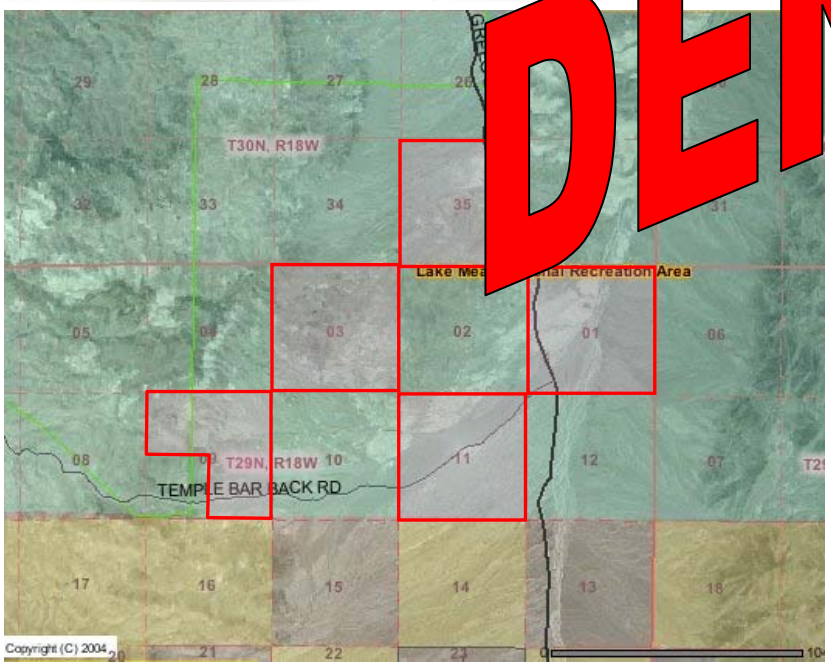
THE VILLAGES AT WHITE HILLS

LAND USE SUMMARY

FEB. 22, 2005

RESIDENTIAL				
LAND USE	**ACRES**	**DENSITY**	**DU**	**% MIX**
LOW DENSITY	1280.5	5	6400	16%
MEDIUM DENSITY	644.0	12	7715	24%
HIGH DENSITY	237.5	25	5934	11%
SUB TOTAL	2162.0		20,049	51%
NON-RESIDENTIAL				
COMMERCIAL*	108.4			
PARKS*	150.4			
ROADWAYS*	306.2			
SUB TOTAL	565.0			
TOTAL	2727.0	7.4	20,049	





Status:

Planning & Zoning Commission recommended conditional approval on 10/12/2005, overiding staff's recommendation of Denial due to conflict with General Plan Goals and obje from the National P Se ce BOS hearing on 1 21 20 5

DENIED

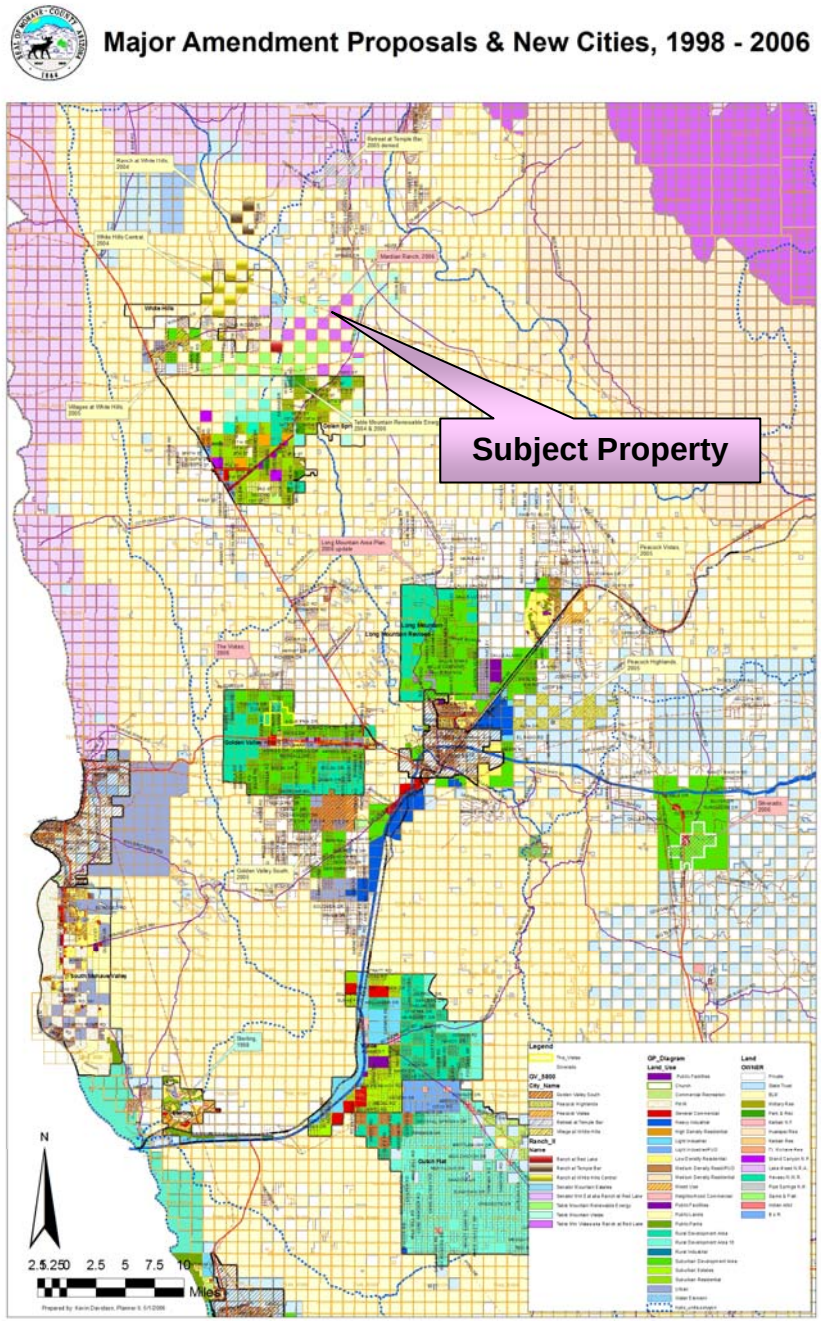
E RETREAT AT TEMPLE BAR
LAND USE SUMMARY
FEB. 24, 2005

RESIDENTIAL				
LAND USE	**ACRES**	**DENSITY**	**DU**	**% MIX**
LOW DENSITY	1,659.3	5	8,294	44%
MEDIUM DENSITY	652.2	12	7,819	41%
HIGH DENSITY	118.8	25	2,965	15%
SUB TOTAL	2,269.3		19,078	100%
NON-RESIDENTIAL				
COMMERCIAL	62.6			
PARKS*	145.6			
GOLF COURSE	141.5			
LAKE	7.2			
ROADWAYS*	252.8			
SUB TOTAL	609.7			
TOTAL	3,040.0	6.3	19,078	

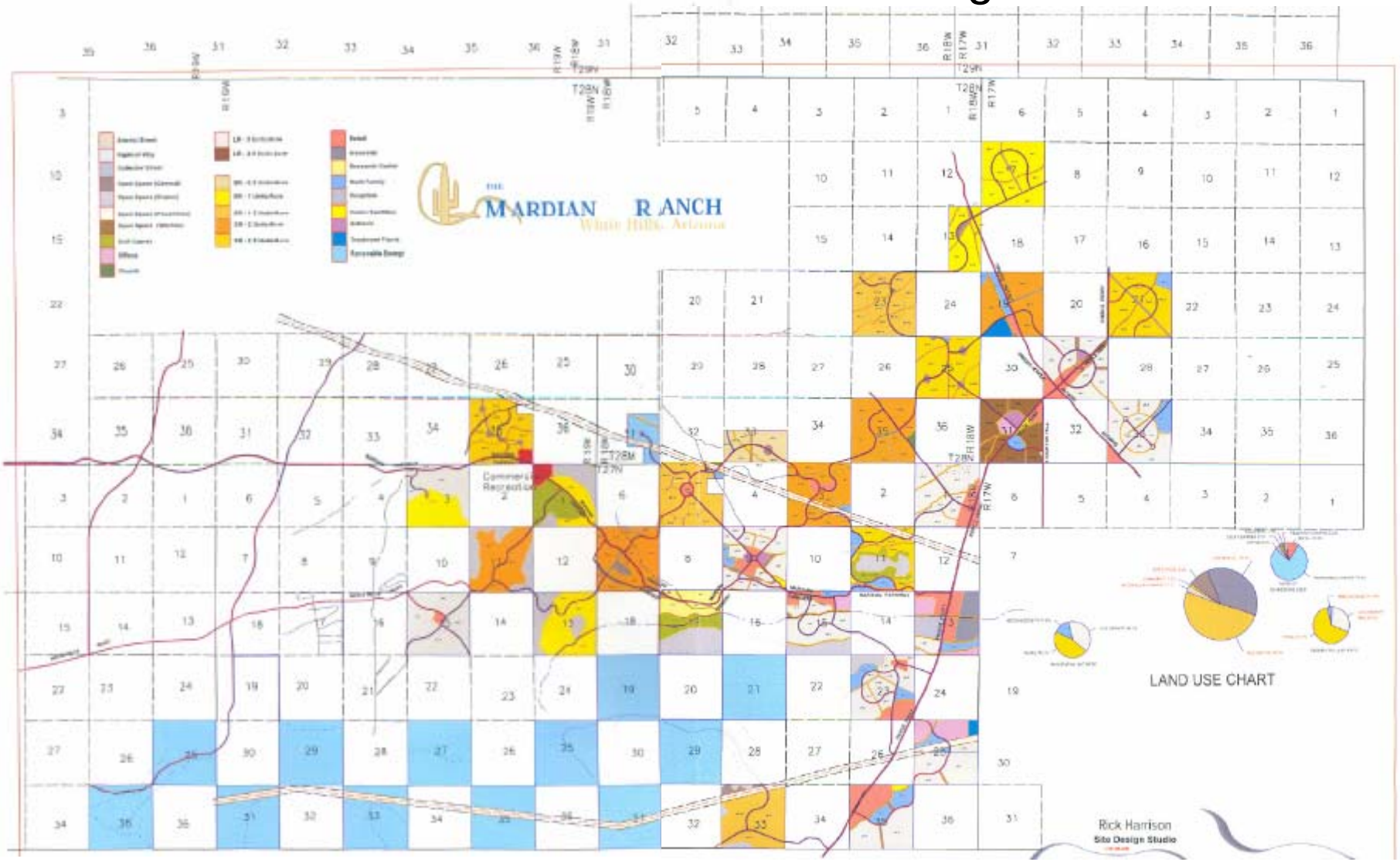

“New Cities”
Class of 2006

Mardian Ranch

The Mardian Ranch Area Plan designates 11,343 acres for 12,040 low, 16,958 medium and 3,780 high-density residential units. Of the 12,040 low density lots, 2,143 lots will be designated for one to two homes per acre. Commercial and light industrial uses will utilize 1,403 acres, including a winery. Parks will comprise 812 acres. Two golf courses are also planned on 260 acres. The Mardian Ranch is envisioned as a self-sustaining community and will serve as a demonstration for sustainable living in the Southwest.



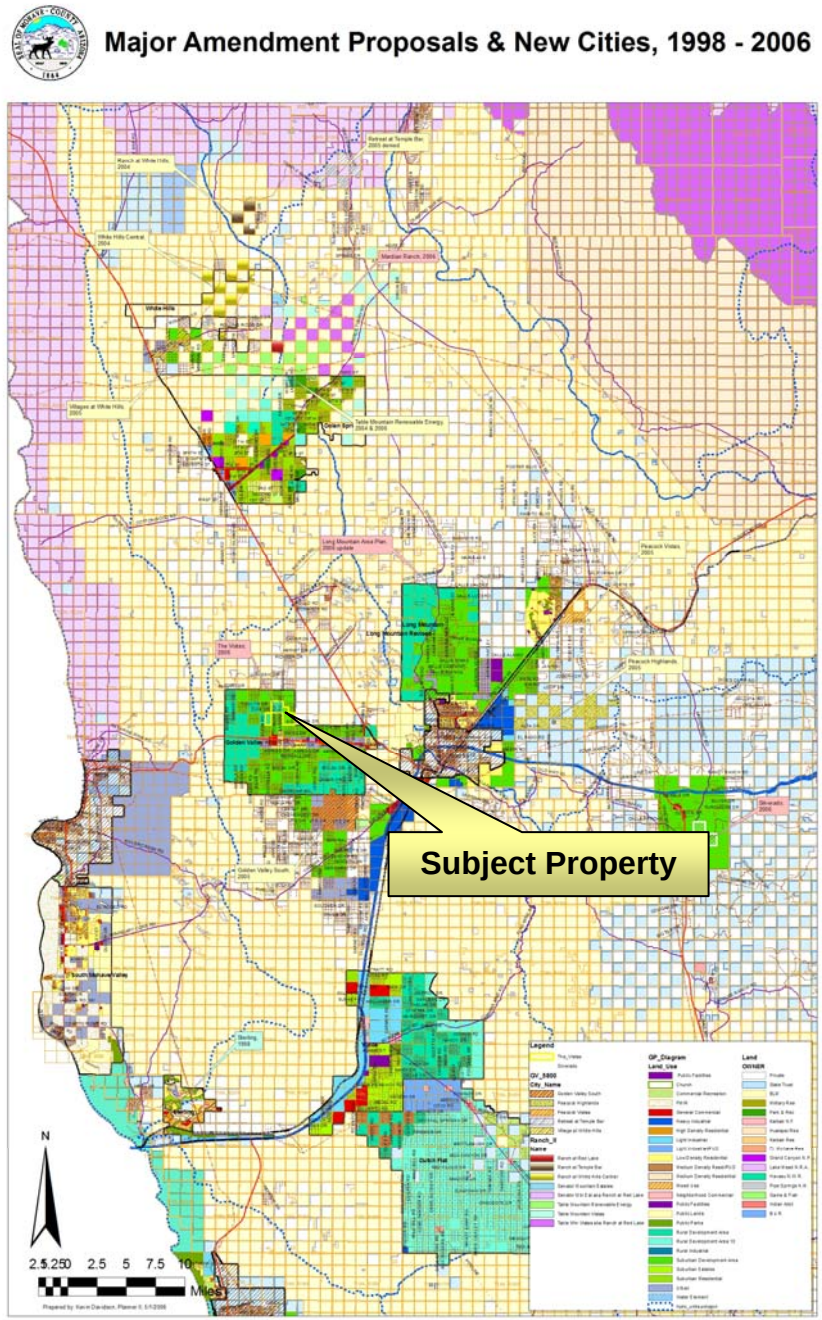
Mardian Ranch Land Use Diagram



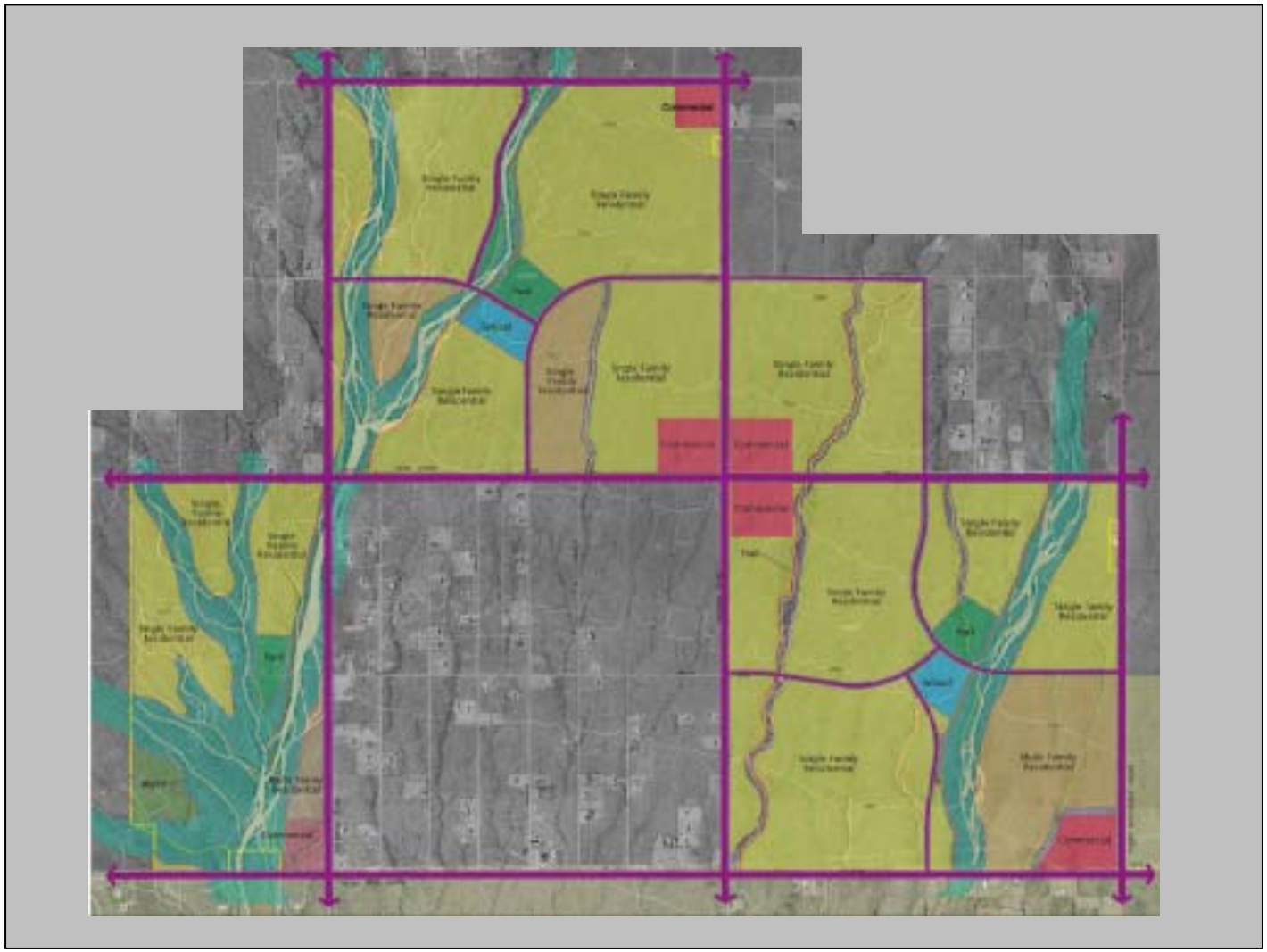
Evaluation of a request for the approval of **THE MARDIAN RANCH AREA PLAN, A REINTERPRETATION AND EXTENSION OF THE CONDITONALLY APPROVED RANCH AT RED LAKE**, consisting of properties located in portions of Township 28 North, Range 17 West, Township 28 North, Range 18 West, Township 28 North, Range 19 West, Township 27 North, Range 18 West, Township 27 North, Range 19 West

Dorado

The Dorado Plan designates 987 acres for 3,440 low-density and 159 acres for 1,330 medium-density residential units. In addition, commercial uses will utilize 30 acres. Parks, open space, and two school sites will comprise approximately 370 acres. Dorado has been planned as a self-sustaining environment uniting an active retiree community and an interconnected community with all age groups, the latter finding employment in the Bullhead/Laughlin and Kingman areas.



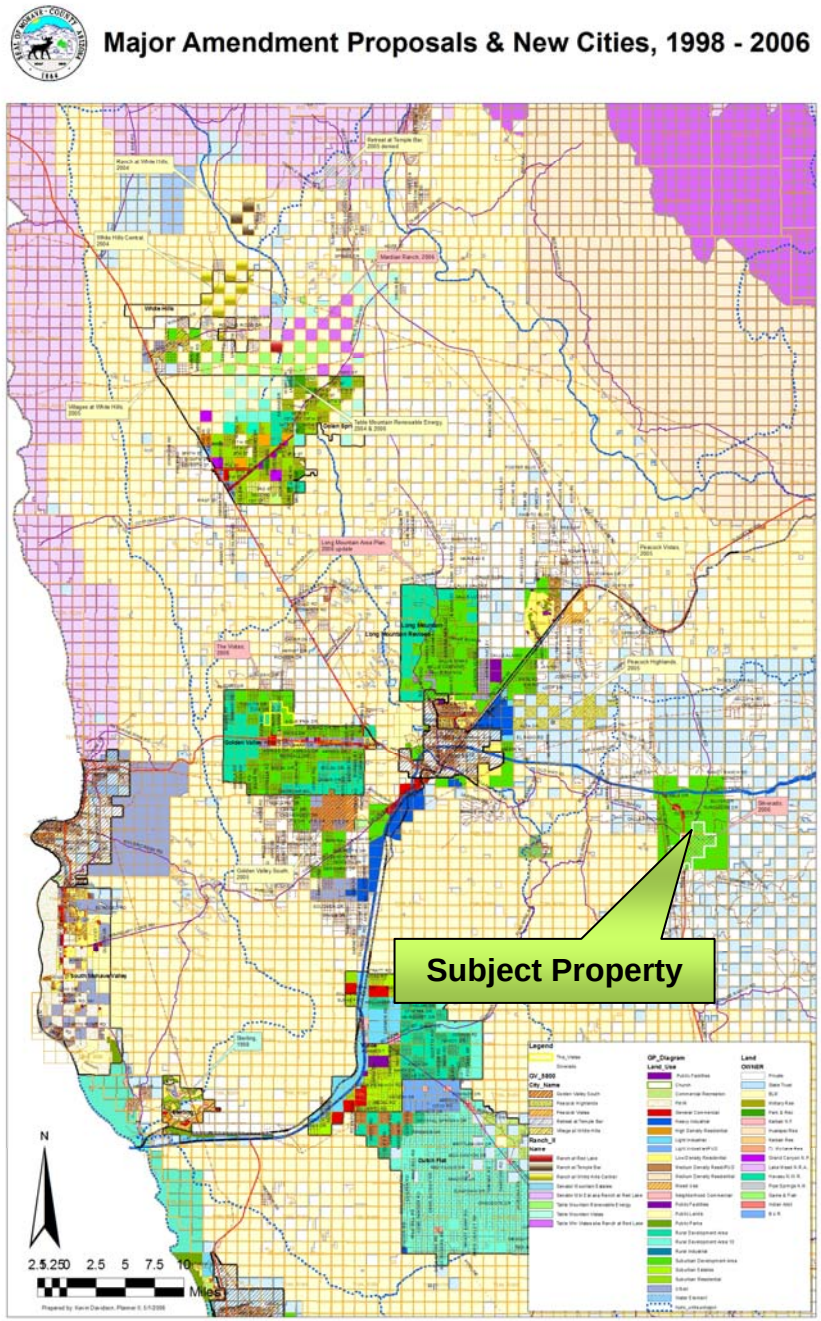
Dorado Land Use Diagram



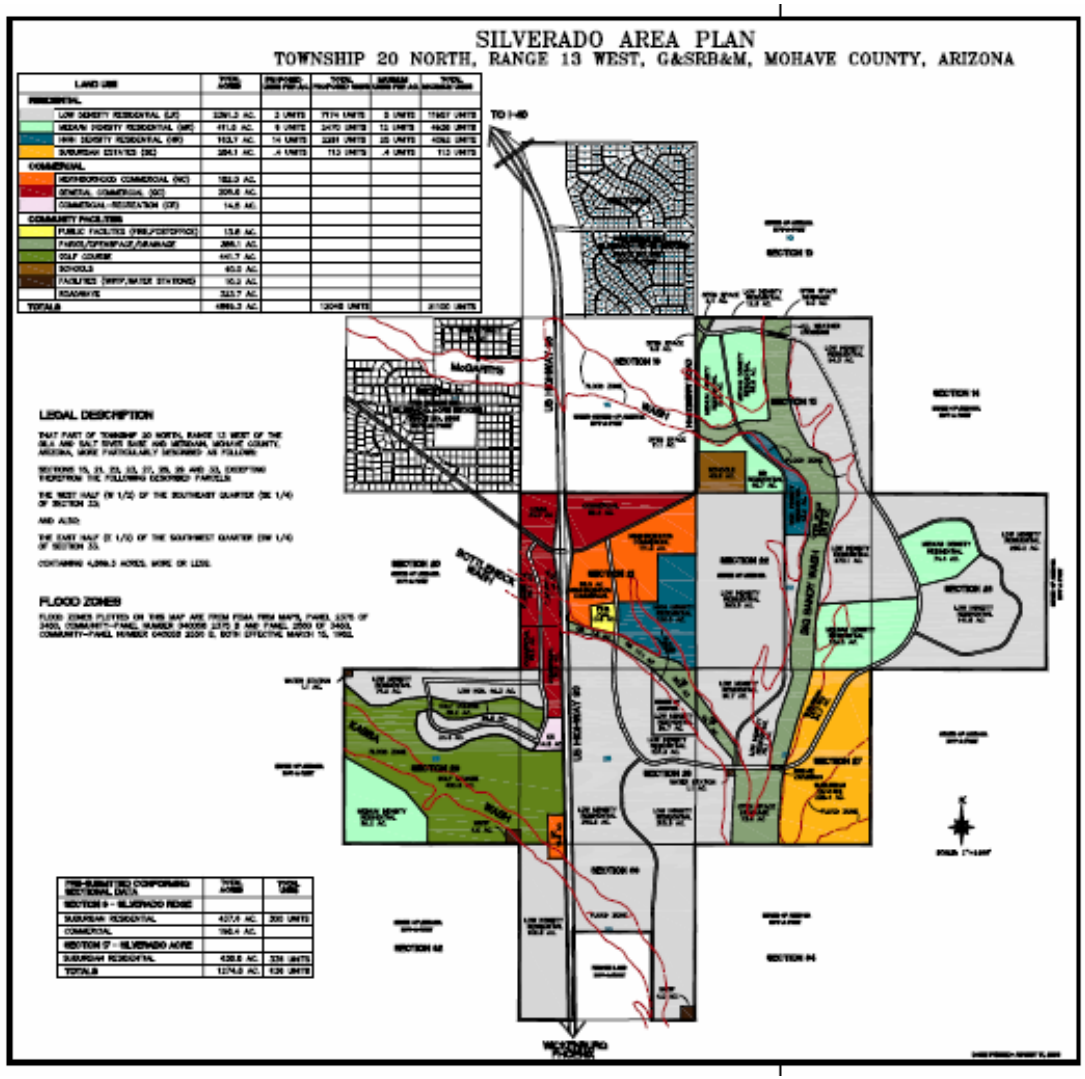
Evaluation of a request for a **MAJOR AMENDMENT TO THE GOLDEN VALLEY AREA PLAN** and a **MAJOR AMENDMENT TO THE MOHAVE COUNTY GENERAL PLAN** for **DORADO** to SW 1/4 Section 25, E 1/2 Section 34 and Sections 26 and 36, Township 22 North, Range 19 West

Silverado

The Silverado Area Plan designates 2,967 acres for 7,174 low, 2,470 medium and 2,291 high-density residential units. In addition, 113 Suburban Estate lots are planned on 284 acres. Commercial uses will utilize 403 acres. Parks and open space will comprise 386 acres. Silverado is envisioned as the eastern residential and commercial gateway to Mohave County and will offer affordable housing and amenities for those wishing to retire to the Southwest and for those who wish to commute to the Kingman area.



Silverado Land Use Diagram



Evaluation of a request for the approval of **SILVERADO AREA PLAN** consisting of properties located in Sections 15, 21, 22, 23, 27, 28, and 29, and a portion of Section 33, Township 20 North, Range 13 West for a new urban center comprised of commercial, recreational, multi-family and single-family land uses on approximately 7.5 square miles

White Hills

RHODES RANCH

Master Planned Golf Course Community

Excerpt from a January, 2003 Press release:

Imagine coming home every day to a Southern Nevada community with lush landscaping, a championship golf course, duck ponds and a dramatic landscape next to picturesque red-rock foothills.

"Rhodes Ranch teleports our homebuyers outside of the desert and into a lush paradise with green grass, mature palm trees and lakes with ducks," said Tawyna Rosenthal, marketing manager at Rhodes Ranch. "Our community is the ultimate luxury escape from everyday life, yet at the center of everything in the Las Vegas Valley."

"What other luxury community in Las Vegas can have its residents at The Strip or McCarran International Airport in an average of less than ten minutes," asked Rosenthal. "Not only is Rhodes Ranch a beautiful and luxurious community in Las Vegas, it is extremely convenient as well."

RHODES RANCH
Master Planned Golf Course Community

Excerpt from a Summer, 2004 Press release:

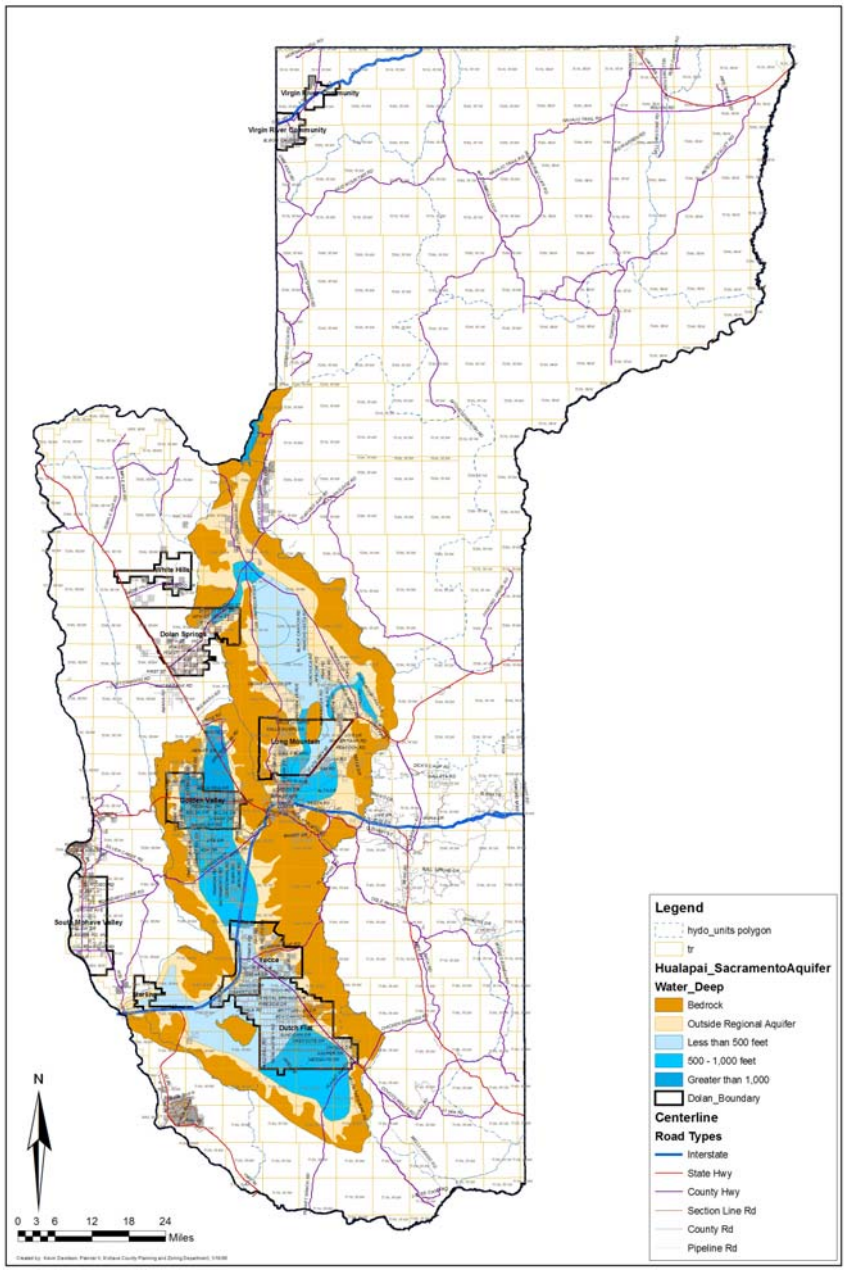
New drought restrictions from the Southern Nevada Water Authority go into effect this month, however most homeowners really won't see a difference until September and October. Once the weather starts cooling down, homeowners will find themselves limited to watering two weekdays a week.

The reason behind the lawn watering restrictions is a multi-year drought that has dropped water levels in Lake Mead to levels not seen since early last century. . . It is just recent that the water level in Lake Mead has dropped to levels that Las Vegas needs to be concerned.

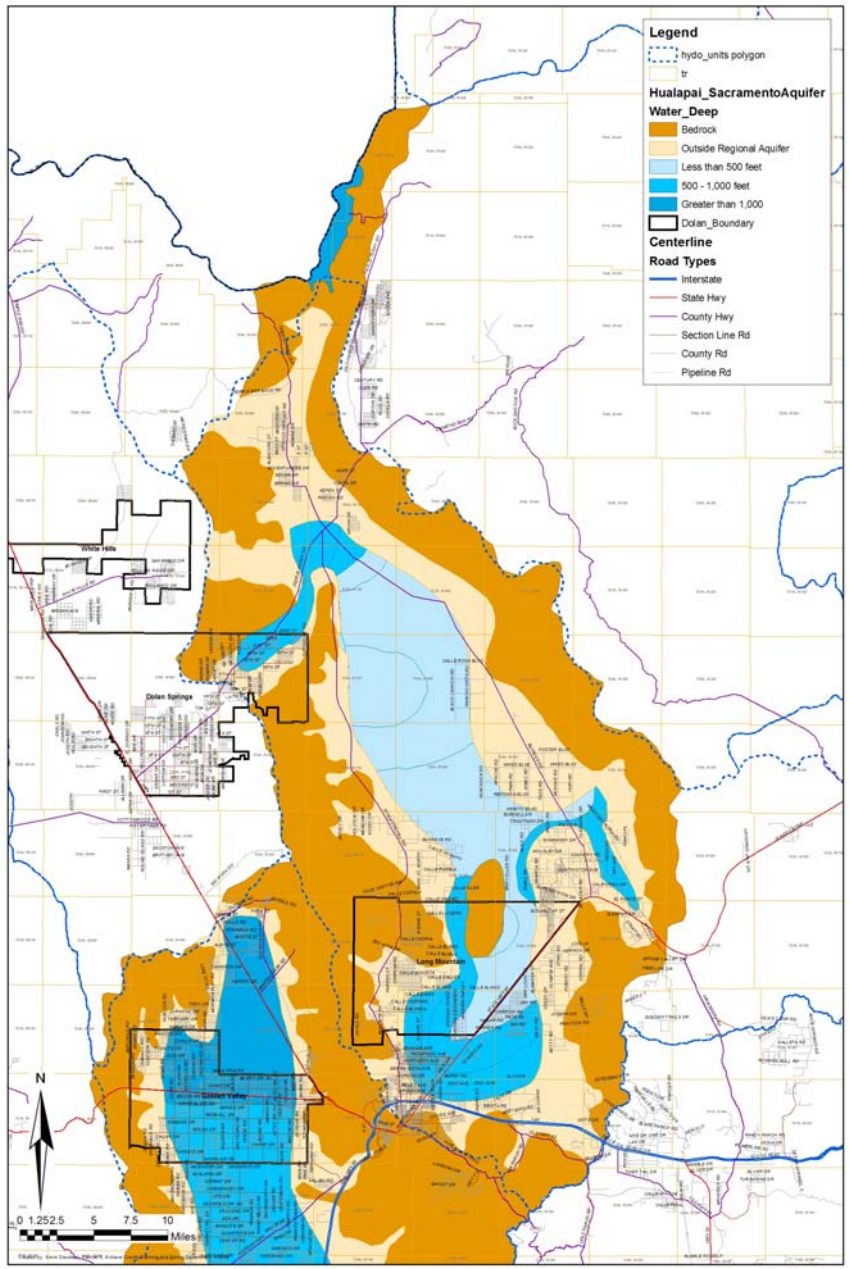
But there are a number of ways to save water and save money (did we mention water rates will be going up as well?). Here are a few easy steps:

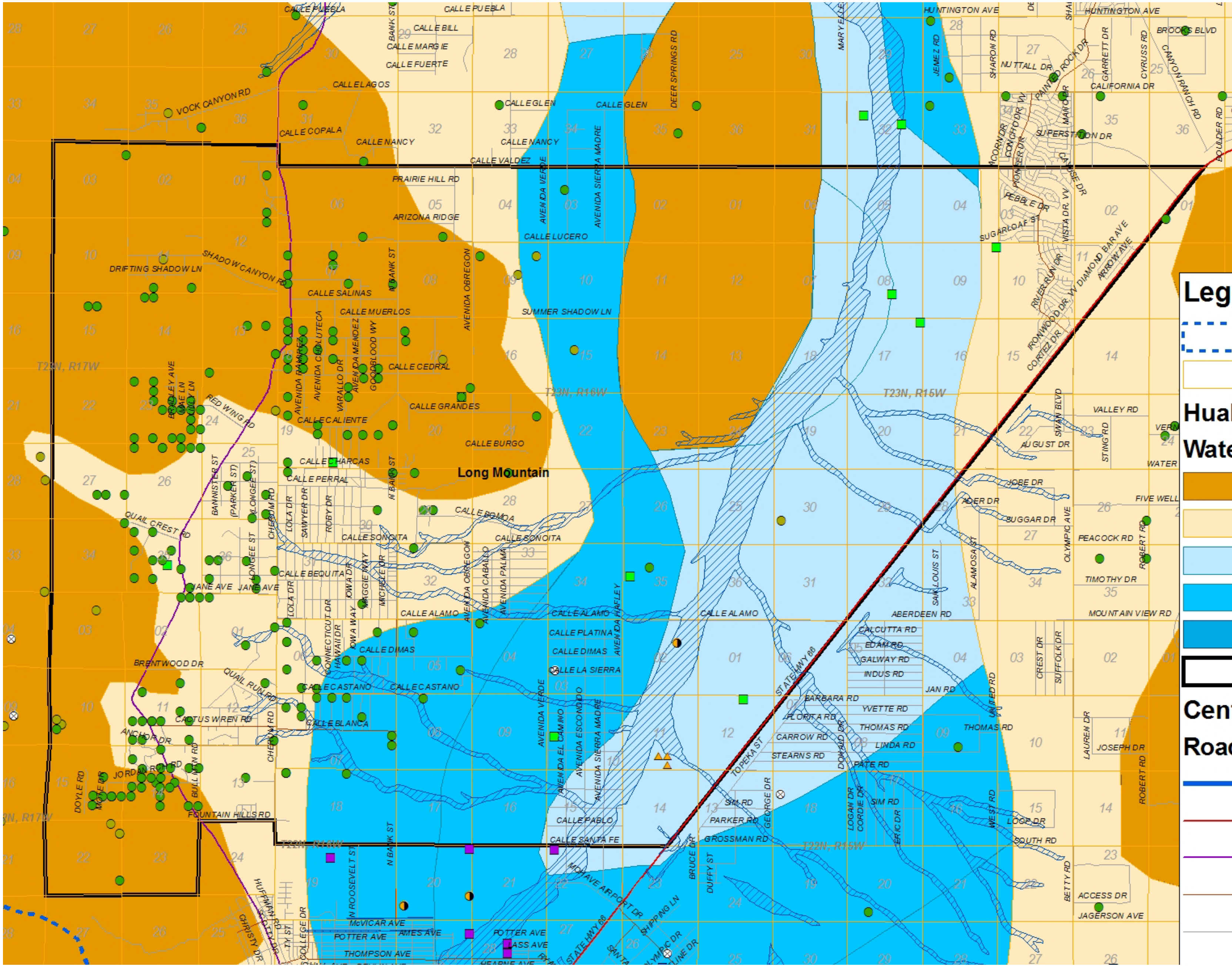
- ✓ Don't water your lawn between 11:00 a.m. and 7:00 p.m. - it will be illegal anyway.
- ✓ Water your lawn by hand instead of wasting water with the sprinklers.
- ✓ Take your car to a car wash where they recycle the water, instead of doing it yourself.
- ✓ Replace your grass with water saving desert landscape.
- ✓ Turn off ornamental water uses such as birdbaths and outdoor fountains until the drought is over.
- ✓ Keep a bucket in your shower to collect water when you are waiting for the water to warm up at the showerhead. Use this water on your lawn or other water smart plants.

Hualapai & Sacramento Valley Basins



Hualapai & Northern Sacramento Valley Basins





Lege
Huala
Water
Cent
Road
Long Mountain
T23N, R17W
T23N, R16W
T23N, R15W
CALLE PUEBLA
HUNTINGTON AVE
BROOKS BLVD
CALLE BILL
CALLE MARGIE
CALLE FUERTE
CALLE LAGOS
VOCK CANYON RD
CALLE GLEN
DEER SPRINGS RD
NUTTALL DR
CALIFORNIA DR
CALLE COPALA
CALLE NANCY
CALLE VALDEZ
SUPERSTITION DR
PRAIRIE HILL RD
AVENIDA VERDE
AVENIDA SIERRA MADRE
ARIZONA RIDGE
CALLE LUCERO
SUGARLOAF ST
DRIFTING SHADOW LN
SHADOW CANYON RD
CALLE SALINAS
SUMMER SHADOW LN
CALLE MUERLOS
CALLE CEDRAL
CALLE GRANDES
RED WING RD
CALLE CALIENTE
CALLE BURGO
VALLEY RD
AUGUST DR
WATER
CALLE CHARCAS
CALLE PERRAL
JOBE DR
ADER DR
FIVE WELL
SUGGAR DR
PEACOCK RD
QUAIL CREST RD
CALLE SONOITA
CALLE BEQUITA
JANE AVE
TIMOTHY DR
CALLE ALAMO
ABERDEEN RD
MOUNTAIN VIEW RD
CALLE PLATINA
CALCUTTA RD
EDAM RD
CALLE DIMAS
GALWAY RD
BRENTWOOD DR
INDUS RD
CALLE LA SIERRA
QUAIL RUN RD
CALLE CASTANO
JAN RD
BARBARA RD
YVETTE RD
FLORIDA RD
CACTUS WREN RD
CALLE BLANCA
CARROW RD
THOMAS RD
LINDA RD
ANCHOR DR
STEARNS RD
JOSEPH DR
PATE RD
JORDAN
SIM RD
LOOP DR
PARKER RD
CALLE PABLO
FOUNTAIN HILLS RD
CALLE SANTA FE
GROSSMAN RD
SOUTH RD
T22N, R15W
MOHAVE AIRPORT DR
ACCESS DR
JAGERSON AVE
McVICAR AVE
AMES AVE
POTTER AVE
THOMPSON AVE
HEARNE AVE
STATE HWY 66
SHIPPING LN

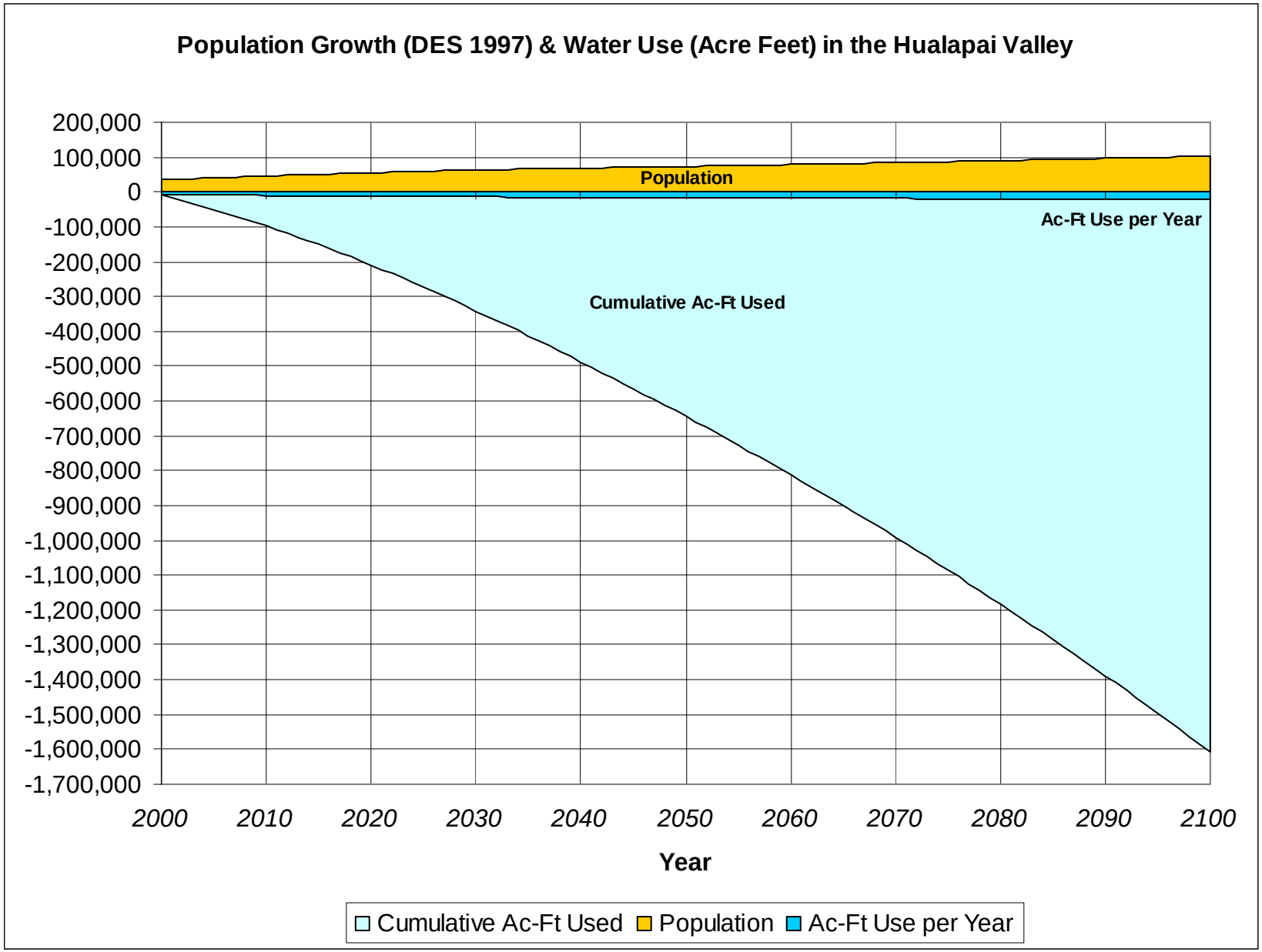
Hualapai Valley (City of Kingman + Unicorporated) Population Projection and Water Use

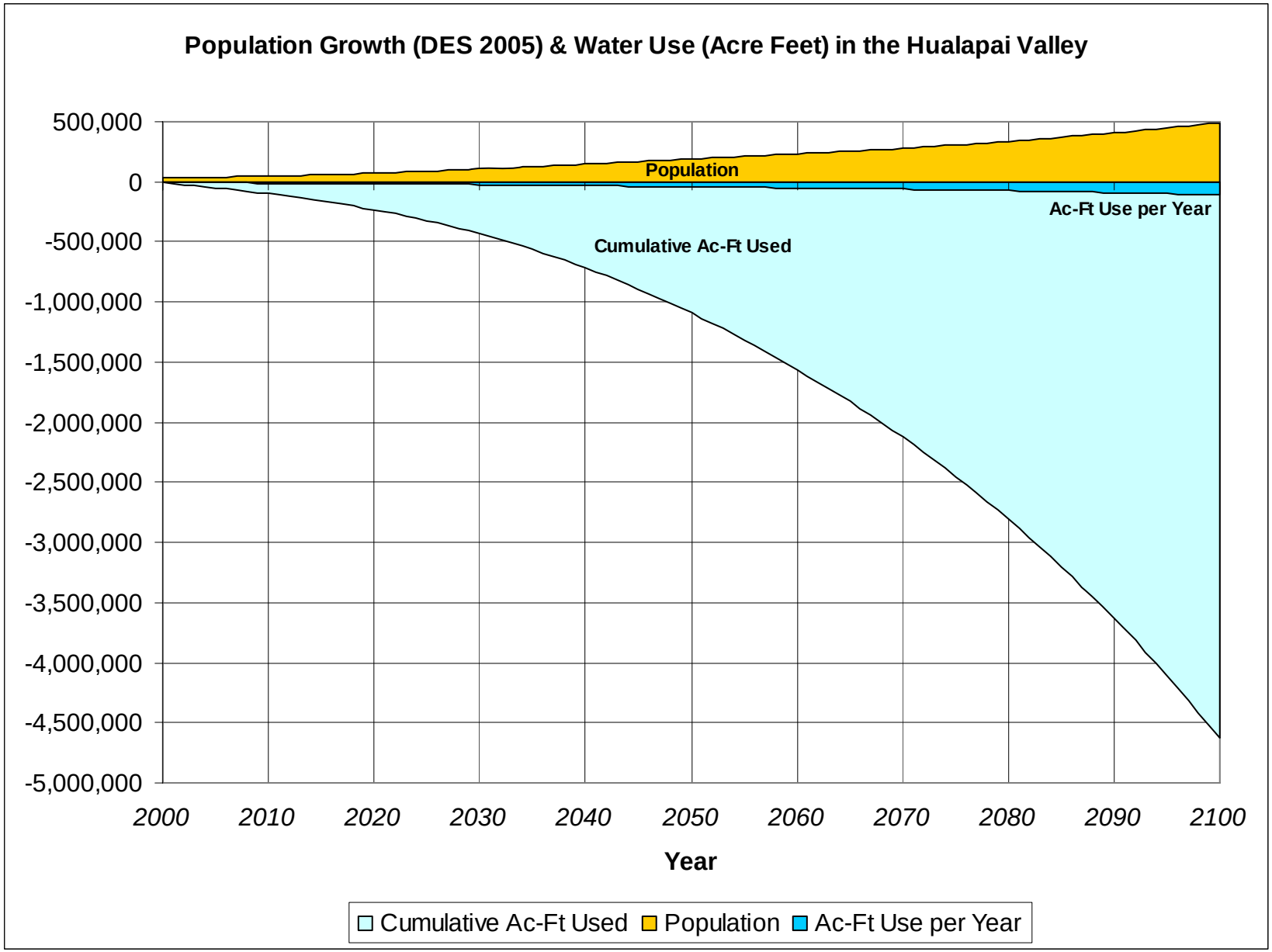
Water Supply w/ Aquifer Recharge equal to Sub-surface Outflow				
Population*	Ac_Feet_Available	AcFt_percapita_Yr	AcFt_Use_Yr	Years_Supply
35,000	5,000,000	0.22	7,700	649
50,000	5,000,000	0.22	11,000	455
100,000	5,000,000	0.22	22,000	227
250,000	5,000,000	0.22	55,000	91
500,000	5,000,000	0.22	110,000	45
1,000,000	5,000,000	0.22	220,000	23
1,500,000	5,000,000	0.22	330,000	15

Water Supply w/ 4,000 ac-ft annual natural recharge & 10% artificial recharge				
Population*	Ac_Feet_Available	AcFt_percapita_Yr	Net_AcFt_Use_Yr	Years_Supply
35,000	5,000,000	0.22	2,930	1,706
50,000	5,000,000	0.22	5,900	847
100,000	5,000,000	0.22	15,800	316
250,000	5,000,000	0.22	45,500	110
500,000	5,000,000	0.22	95,000	53
1,000,000	5,000,000	0.22	194,000	26
1,500,000	5,000,000	0.22	293,000	17

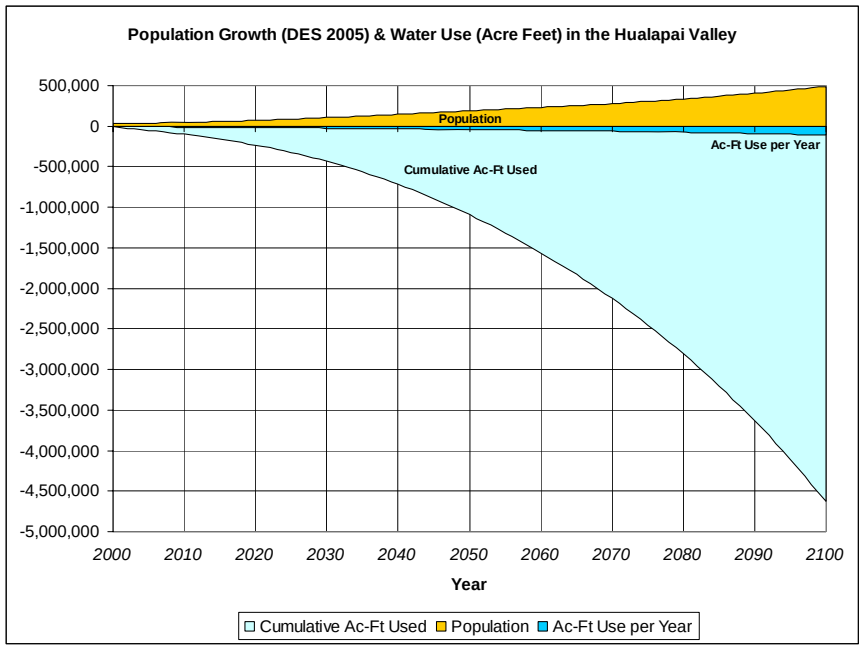
* Does not include downtown Kingman since it is part of the Sacramento Basin

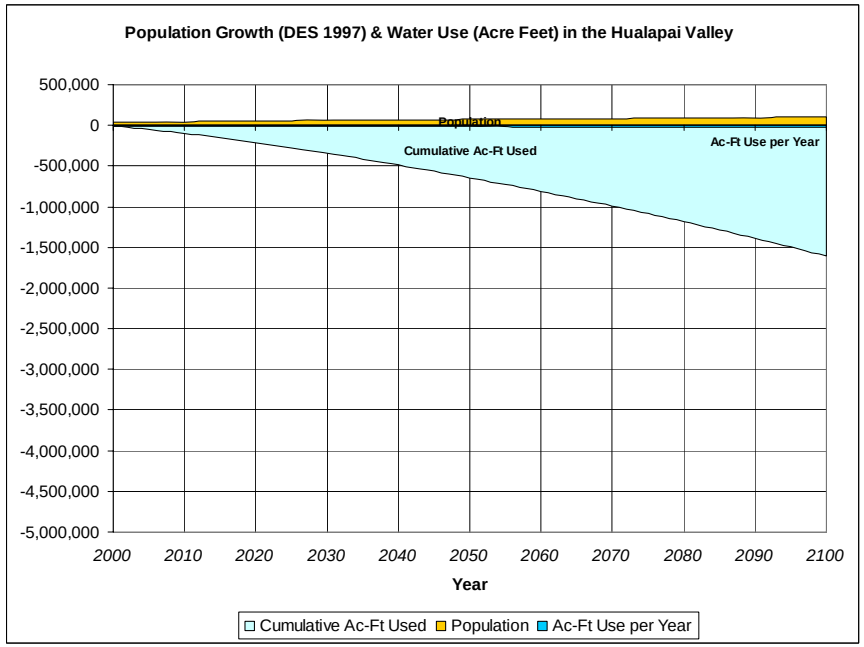
Acre feet available to 1,200 feet below land surface


Population Growth (DES 1997) & Water Use (Acre Feet) in the Hualapai Valley
200,000
100,000
0
-100,000
-200,000
-300,000
-400,000
-500,000
-600,000
-700,000
-800,000
-900,000
-1,000,000
-1,100,000
-1,200,000
-1,300,000
-1,400,000
-1,500,000
-1,600,000
-1,700,000
Population
Ac-Ft Use per Year
Cumulative Ac-Ft Used
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
Year
Cumulative Ac-Ft Used
Population
Ac-Ft Use per Year


Population Growth (DES 2005) & Water Use (Acre Feet) in the Hualapai Valley
500,000
0
-500,000
-1,000,000
-1,500,000
-2,000,000
-2,500,000
-3,000,000
-3,500,000
-4,000,000
-4,500,000
-5,000,000
Population
Ac-Ft Use per Year
Cumulative Ac-Ft Used
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
Year
Cumulative Ac-Ft Used
Population
Ac-Ft Use per Year

Impact of Two Growth Scenarios on Water Consumption





ADWR 2000 Well Data	# of Wells	Avg Well Depth	Avg Water Level	% Wells w/ Water Level > 500'	Max Well Depth	Max Water Level	Avg Pump Rate (gpm)	Average Drawdown (ft)
Colorado River								
Big Sandy								
Wikieup	133	285.6	122.3	2.26%	1,360.0	1,080.0	45.3	3.06
Detrital Valley	249	436.6	317.6	11.65%	1,200.0	900.0	13.8	6.76
Grand Wash	48	726.1	223.0	2.08%	4,490.0	700.0	1.6	0.42
Hualapai Valley	880	432.2	270.9	12.95%	2,300.0	2,120.0	56.5	17.59
Kanab Plateau	314	676.1	186.6	1.59%	6,405.0	2,494.0	10.4	4.96
Lake Havasu	380	174.7	90.4	0.26%	1,205.0	540.0	70.3	5.85
Lake Mohave	2,670	138.6	68.8	0.34%	1,300.0	1,500.0	89.4	3.14
Meadview	39	600.9	447.2	10.26%	1,365.0	1,050.0	21.5	0.13
Peach Springs	33	306.7	185.1	6.06%	924.0	737.0	67.5	17.18
Sacramento Valley	1,158	368.1	214.9	6.91%	2,510.0	1,332.0	17.0	9.70
Shiwwits Plateau	61	699.6	25.3	0.00%	2,130.0	53.0	4.9	0.03
Total	**5,965**	**272.3**	**139.3**	**4.16%**	6,405.0	2,494.0	58.9	6.97

Christopher J. Eastoe, Ph.D.
Staff Scientist
520-621-1638 (office)
520-621-2672 (fax)
eastoe@geo.arizona.edu (e-mail)

THE UNIVERSITY OF ARIZONA
TUCSON ARIZONA

Radiocarbon Laboratory
Department of Geosciences
Gould-Simpson Building
Tucson AZ 85721-0077
USA

October 21, 2005

Mr. Elno Roundy
P.O Box 3222
Kingman AZ 86402

Dear Mr. Roundy:

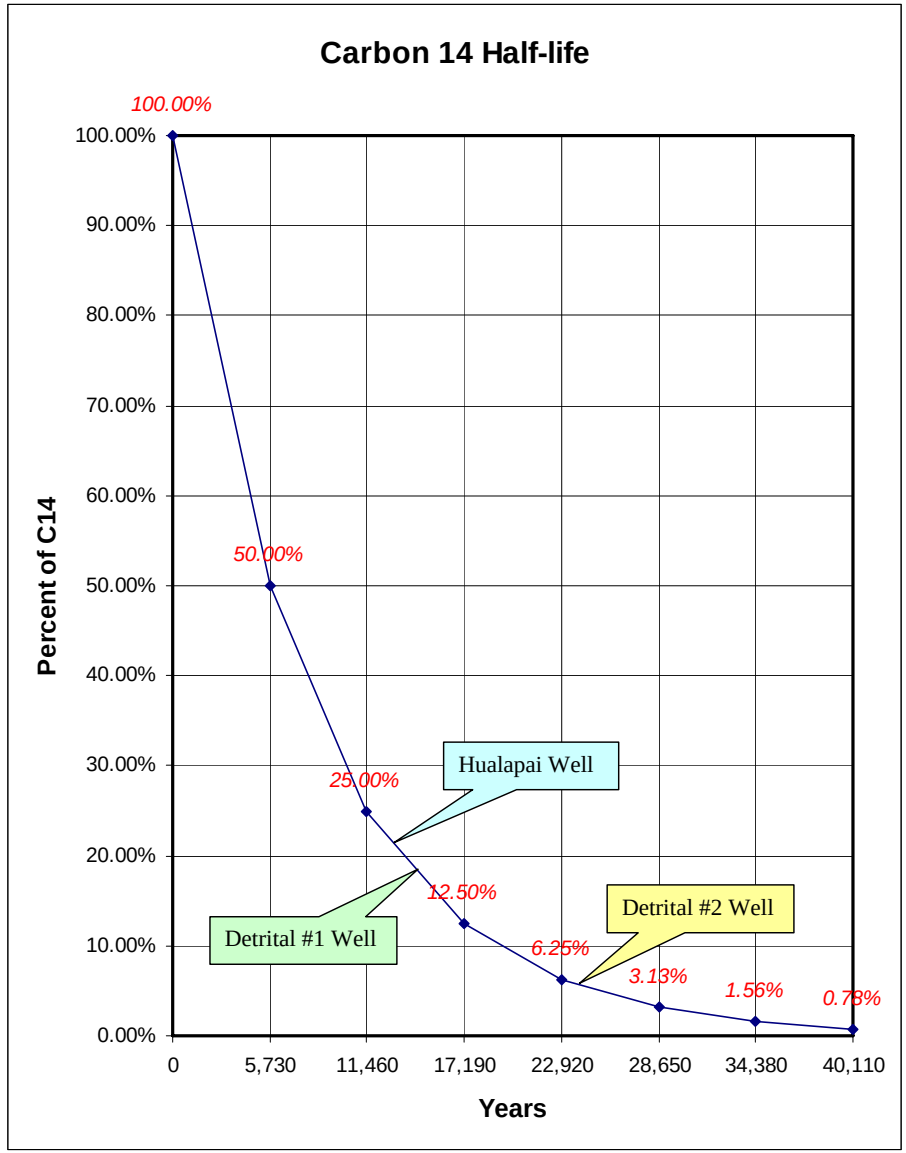
Here are the results for the samples you submitted in April and May.

A-number	Sample	C14 content, percent modern carbon	$\delta^{13}C$, ‰
13813 AA64624	29 well #1	21.9 ± 0.2	-5.5
13837 AA64976	White Hills well, lower aquifer	5.8 ± 0.1	-8.8
13857	White Hills well #2, upper aquifer	18.4 ± 0.2	-9.8

The data are not corrected for $\delta^{13}C$.

Best wishes with your research!

Chris Eastoe
Staff Scientist



A Few Fun Facts for New Cities

Population	
Persons/household*	2.45
200000 households	490,000
* 2000 Census for Mohave County	
Households	200,000

Daily Vehicle Trips	
Trips per SFDU*	9.55
Trips per 200000 SFDU	1,910,000
* ITE Trip Generation, 7th Edition	

Household Emissions	
Tons/CO2/year*	61.23
Tons/Methane/year*	7.14
Tons/NOX/year*	3.88
Tons/other/year*	8.16
Total Tons	**80.41**
Tons/CO2/yr/200000	12,246,000
Tons/Methane/yr/200000	1,428,000
Tons/NOX/yr/200000	776,000
Tons/other/yr/200000	1,632,000
Total Tons	**16,082,000**
* Rocky Mountain Institute, 1998	

Water Use	
AcFt/percapita/year	0.20
Persons/Household	2.45
AcFt/perhousehold/year	0.49
AcFt/per200000HH/yr	98,000
Est Water Available*	12,000,000
2000 households	62,000
AcFt/per62000HH/yr	30,380
Years Supply for "Cities"	**122.45**
Years Supply for All**	**93.47**
* Hualapai, Sacramento & Detrital Basins	
** New Cities plus existing households in 2000	

Solid Waste	
Lbs/percapita/day*	4.50
Persons/household	2.45
Lbs/household/day	11.03
Lbs/household/year	4,027
Tons/200000HH/year	402,688
* 2003 estimate from Milestones in Garbage: 1990–Present	

Gasoline Consumption	
Gals/percapita/year*	365.7
Persons/household	2.45
200000 households	490,000
Gals/200000HH/year	179,193,000
Cost at $3.00/gallon/yr	$537,579,000
* Energy Information Administration, DOE	

ARS §11-821.C.3

C. In addition to the other matters that are required or authorized under this section and article 1 of this chapter, for counties having a population of more than one hundred twenty-five thousand persons according to the most recent United States decennial census, the county plan shall include, and for other counties the county plan may include:

3. Planning for water resources that addresses:

(a) The known legally and physically available surface water, groundwater and effluent supplies.

(b) The demand for water that will result from future growth projected in the county plan, added to existing uses.

(c) An analysis of how the demand for water that will result from future growth projected in the comprehensive plan will be served by the water supplies identified in subdivision (a) of this paragraph or a plan to obtain additional necessary water supplies.

Interpretations

The “plan to obtain” can be clarified with a few examples. **Conservation** can be considered a plan just as expanding a water system by drilling more wells.

No mention is made of a 100-year time frame in the statute, so the law can be interpreted as providing water for future growth **in perpetuity**.

Other ways to ensure that future growth is served is to treat wastewater for **reuse**, **recycle** gray water, **harvest** rain water, and collect storm water runoff for active groundwater **recharge**.

Interesting to note is the emphasis on additional “necessary” water supplies. How shall that be defined? Water for drinking and cooking is obvious, but is it “necessary” to keep the grass green, or even have grass in the first place?

Additionally, water provided to a power plant that exports electricity out of the county to a metropolitan area may be necessary for those befitting but not for the county as whole who will need the water for future necessary uses.

General Plan – Key Water Issues

Colorado River Water. The quality of water in Lakes Mead, Mohave and Havasu must be maintained to continue attracting tourists to the County. While many other jurisdictions have an impact on the Colorado River, Mohave County's economy and water supplies are so directly linked to the lakes and river that the County has a vital interest in preventing their contamination.

Groundwater Quality. To ensure the viability of its continued use, the quality of area groundwater should be monitored regularly. Key recharge areas in the mountains and bajadas should be protected from development activities that degrade water quality. The effects of urban runoff and septic systems effluent on groundwater quality should be minimized. Mohave County's updated Area-wide Water Quality Management Plan ("208" Plan) is a tool to maintain watershed health.

Water Availability. Information on the use and availability of water should be monitored. While there appears to be enough water to meet anticipated demands in the rapidly urbanizing parts of the County for the next 40 to 50 years, long term water planning throughout the County will require better information than is currently available. Development of a Countywide water budget that identifies water supplies and demands for identified groundwater basin sub-areas will enable the County to use its water resources most efficiently.

General Plan – Goal and Policies

Goal 3: **To preserve the quantity and quality of water resources, in perpetuity, throughout the County.**

Policy 3.1 Mohave County should cooperate with ADEQ, local water suppliers, and other agencies to maintain a water budget that inventories the quantity and quality of the County's water resources, identifies how those resources are being used, and monitors commitments for future water use.

Policy 3.2 The County should support programs to monitor groundwater quality and well levels.

Policy 3.3 Mohave County should encourage the efficient use of water resources through educational efforts.

Policy 3.4 New water intensive uses such as golf courses and man-made lakes shall require the use of treated effluent where and when available.

Policy 3.5 Mohave County will only approve power plants using “dry cooling” technology when the aquifer is threatened by depletion or subsidence.

General Plan – Implementation Measures

WQ1: Support efforts by utility providers, ADEQ, ADWR, USGS, and USBOR to prepare and maintain a water budget for Mohave County and for individual drainage basins. This water budget should provide information on groundwater yields, contracts, and demands and changes in ground water levels. Mohave County's role should include provision of information available to the County and assistance in coordinating reports.

WQ2: When Area Plans or the General Plan are scheduled for review and update, the latter conducted at least every ten years, a water budget shall be developed, with the aid of the Arizona Department of Water Resources, to prevent the mining or, in some cases, further mining of groundwater.

Area-wide Water Quality Management "208" Plan

Mohave County was assigned as Designated Planning Agency in 2000.

- **Planning area** – Follows Mohave County boundaries, with the exception of the Fort Mojave, Hualapai, and Kaibab-Paiute Indian Reservation lands.
- **Surface and groundwater quality assessment** - water quality status and existing and potential problem areas are identified with recommendations for prioritizing and/or managing water quality problems.
- **Description of point source discharges and waste management** - assessment of decentralized and centralized wastewater treatment facilities, including the five Designated Management Areas, and information regarding effluent disposal, bio-solids disposal, pretreatment, solid waste & underground storage tanks.
- **Non-point source management** – Includes agriculture, forest management, grazing, resource extraction, urban runoff, and road runoff and ADEQ demonstration projects.
- **Drinking water systems** - Groundwater protection programs and the viability of small systems. Approximately 72% of active drinking water systems within the County are in full compliance, with 13% in substantial compliance, and 14% in non-compliance.
- **County continuing planning process** - Watershed planning is described to illustrate water quality management policy. Funding sources for water quality management capital projects are discussed.

http://www.co.mohave.az.us/deptfiles/PZ/208_plan/208Final.pdf

Land Division Regulations

Final Plat - 3.11.F.19. Determination of Water Adequacy from the Arizona Department of Water Resources (ADWR).

For subdivisions in Suburban Development Areas and Urban Development Areas which receive a statement of water inadequacy, five (5) copies of a report prepared and sealed by a qualified engineer or hydrologist in the State of Arizona, demonstrating and affirming that the project has access to sufficient water resources, that are legally available to the applicant or service provider, to support the built-out development on a permanent basis.

However, if the ADWR determines that a subdivision without urban lots has an inadequate water supply, that finding shall be placed on the Final Plat, and in the public report application submitted to the Arizona Department of Real Estate.

Land Division Regulations

Improvements - 5.1.D.1. Water Supply.

a. The developer shall provide an ADEQ or applicable agency approved public or semi-public or private water system with adequate pressures for fire flows at 100 percent (100%) occupancy for 100 years to all lots within a subdivision containing any lots less than five (five) acres in size,

b. Where required, action shall be taken by the developer to extend or create a water supply district, and/or water company for the purpose of providing a water system and supply.

c. The developer may be required to submit additional information or proof of water availability in the form of hydrological reports prepared by a qualified hydrologist in the State of Arizona, and/or qualified geologist or other registered engineer.

Environmental Health Division

INTRODUCTION

Mohave County Environmental Health Division (MCEHD) does not regulate water quality, however, would like to provide this information regarding what type of holding/storage tank to use for drinking water and some basic guidelines on cleaning and maintaining a drinking water storage tank.

SOURCE OF WATER

MCEHD recommends utilizing a public water system or other approved community water system for the water supply source. Contact the public water system that will provide you with drinking water. You may want to ask for their most recent water quality report to ensure the water system is current with drinking water requirements.

EQUIPMENT PREPARATION

Tanks used for holding and storage of water should be of an acceptable type. ***Use tanks previously used ONLY for hauling water or food grade materials.*** ***MCEHD RECOMMENDS NOT USING TANKS THAT HAVE PREVIOUSLY HAULED ANY OTHER MATERIALS EXCEPT FOOD OR WATER.*** Many other materials can be absorbed into the tank over time and eventually leach back out into your clean drinking water which may be dangerous.

NOTE: When transporting tanks make sure the tank is properly sealed to avoid insects, dust and debris being allowed into the tank.

Mohave County
Department of Public Health
Count On Us.

HAULED WATER GUIDELINES

Guidelines for water source and equipment preparation for homeowners

Environmental Health Division

Permit Eligibility and Usage Requirements

- The general permit is meant for private residential use only. Gray water must be used on the site where it is generated and cannot be accessed by the public.
- Under this permit, gray water can only be used for irrigation – not for dust control, cooling or other water uses.
- Spray irrigation is not permitted due to the potential for inhalation or drifting off-site.
- Gray water flow must be less than 400 gallons per day.

City-wide efforts to reuse graywater have also been applied as seen by these purple pipes in Peoria.

Jomax Water Reclamation Facility, northern Peoria

The Old vs. the New Rule

The Old Way...

Many people were discouraged from using gray water by previous requirements to submit specific design plans for ADEQ review and meet the chlorination, sampling and filtering requirements necessary to remain in compliance, so they did not apply for the required permits.

The New Way...

To make the process easier for homeowners who want to use gray water at their homes, ADEQ developed the new rules with stakeholder input. Many of these rules are based on the results of a gray water study conducted in the Tucson area, which you can view at www.watercasa.org/research/residential/resindex.htm.

The basic requirements to use gray water at your home are simple:

- Residents must adhere to the guidelines for a Reclaimed Water Type 1 General Permit. A Type 1 General Permit requires no formal notification to the department, no review or design approval, and no public notice, reporting or renewal.
- Although you don't have to apply to receive a formal permit for permission to use gray water, you must abide by the 13 best management practices (BMPs) listed in this brochure, which were developed to protect public health and water quality.

The rule can be found in Title 18, Chapter 9, Article 7. To obtain a copy of the gray water rule, you may download it at www.sosaz.com/public_services/title_18/18-09.pdf or call the nearest ADEQ office.

Using Gray Water at Home

The Arizona Department of Environmental Quality's Guide to Complying with the New, Simplified Type 1 General Permit

ADEQ
Arizona Department of Environmental Quality

Updated March 2003
Publication No. C 01-06

RESOLUTION NO. 2002-119

A RESOLUTION DECLARING A DROUGHT EMERGENCY TO EXIST EFFECTIVE APRIL 1, 2002

WHEREAS, precipitation throughout Mohave County during the past winter was well below normal; and

WHEREAS, weather forecasts through next September indicate higher than normal temperatures; and

WHEREAS, the lack of rain has created drought conditions throughout Mohave County with no near term relief in sight; and

WHEREAS, the drought endangers the crops, property, and livestock of a considerable number of the citizens of Mohave County; and

WHEREAS, ranching and agriculture comprise a significant portion of Mohave County's economy; and

WHEREAS, the drought is causing significant economic injury; and

WHEREAS, the Board of Supervisors has the authority pursuant to A.R.S. 26-311 to declare that a local emergency does exist within Mohave County due to severe drought conditions;

NOW, THEREFORE, it is hereby declared that a drought emergency now exists in Mohave County and hereby directs that:

a. The Mohave County Emergency Operations Plan is hereby activated and in effect.
b. This declaration supports the State of Arizona's drought emergency.
c. Assistance from the State and Federal Government is requested for the appropriate disaster programs.

PASSED, APPROVED AND ADOPTED this 1st day of April, 2002.

MOHAVE COUNTY BOARD OF SUPERVISORS

Pete Byers

Pete Byers, Chairman

ATTEST:

Barbara Brickner

Barbara Brickner, Clerk of the Board

BOARD OF SUPERVISORS MOHAVE COUNTY ARIZONA DITAT DEUS

County Resolution Responding to Drought

House Bill 2323

ARS 43-1090.01. Credit for water conservation systems; definition

A. SUBJECT TO SUBSECTIONS H AND I OF THIS SECTION, FOR TAXABLE YEARS BEGINNING FROM AND AFTER **DECEMBER 31, 2006 AND ENDING BEFORE JANUARY 1, 2012**, A CREDIT IS ALLOWED AGAINST THE TAXES IMPOSED BY THIS TITLE FOR EACH RESIDENT WHO IS NOT A DEPENDENT OF ANOTHER TAXPAYER FOR INSTALLING A WATER CONSERVATION SYSTEM DURING THE TAXABLE YEAR IN THE TAXPAYER'S RESIDENCE LOCATED IN THIS STATE. **THE CREDIT IS EQUAL TO TWENTY-FIVE PER CENT OF THE COST OF THE SYSTEM.**

B. THE MAXIMUM CREDIT IN A TAXABLE YEAR MAY NOT EXCEED ONE THOUSAND DOLLARS.

ARS 43-1182. Credit for water conservation system plumbing stub outs installed in houses constructed by taxpayer; definition

A. SUBJECT TO SUBSECTIONS F AND G, FOR TAXABLE YEARS BEGINNING FROM AND AFTER **DECEMBER 31, 2006 AND ENDING BEFORE JANUARY 1, 2012**, A CREDIT IS ALLOWED AGAINST THE TAXES IMPOSED BY THIS TITLE FOR COSTS INCURRED DURING THE TAXABLE YEAR OF INSTALLING OR INCLUDING IN ONE OR MORE HOUSES OR DWELLING UNITS LOCATED IN THIS STATE AND CONSTRUCTED BY THE TAXPAYER A WATER CONSERVATION SYSTEM **PLUMBING STUB OUT THAT COLLECTS ALL GRAYWATER SOURCES THAT END AT A PLUMBING STUB OUT THAT IS SEPARATE AND DISTINCT FROM THE REGULAR PLUMBING SYSTEM**. TO QUALIFY FOR THE CREDIT THE STUB OUT MUST:

1. COMPLY WITH RULES THAT ARE ADOPTED BY THE DEPARTMENT OF ENVIRONMENTAL QUALITY AND THAT RELATE TO THE DIRECT REUSE OF RECLAIMED WATER.

2. MEET APPLICABLE LOCAL BUILDING CODES.

B. THE CREDIT SHALL NOT EXCEED TWO HUNDRED DOLLARS FOR EACH SEPARATE HOUSE OR DWELLING UNIT IN WHICH THE WATER CONSERVATION SYSTEM PLUMBING STUB OUTS ARE INSTALLED.

Rainwater Harvesting System on Tract Home in Kingman

305 gallon water storage tank connected to roof drain via Flex-a-Spout and sheet metal scupper intercept

Arizona Policy Forum Recommendations (9/23/2004)

- Require developers or communities to show a 100-year water supply before new homes were built. Under existing law, a builder can sell a lot or a house even if state engineers say there's not enough water. Subsequent buyers don't have to be informed of that finding.

- Require proof of a 100-year water supply before a new well could be drilled for residential use.

- Establish a resource fee of $500 per house to provide matching funds to find new water sources, purchase the water or build pipelines or canals to move it from one place to another *(possible conflict with law prohibiting inter-basin transfers).*

Water Wisdom

- **Black Mesa Water Coalition**

  The living beings of this land must learn to live within the resource boundaries our Mother Earth has outlined. Water is precious on this land. It is the responsibility of us all to begin transitioning to a future more sustainable; and a lifestyle that is, at the very least, more conscious of our Mother Earth's scarce and precious resources.

- **Excerpt from Hopi Declaration of Water, Second Mesa, Arizona, 2003**

  Water, the breath of all life, water the sustainer of all life, water the voice of our ancestors, water pristine and powerful. Honor and respect water as a sacred and life-giving gift from the Creator of Life. Water, the first living spirit on Earth. All living beings come from water, all is sustained by water, all will return to water to begin life anew. What we do to water, We do to ourselves.

- **Genesis 1**

  And the Spirit moved upon the face of the waters, letting the waters bring forth abundantly the moving creatures that have life, and God saw that it was good.